Investigating Specialized Discourse

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Changing Conventions

Introduction

Some readers may question the need for yet another book on specialized discourse. There are already so many titles on the subject, and it has been approached from so many different angles that it seems arduous to say something new or original. There is, however, a feeling of unease among linguists who, like myself, have examined the work published over the years in this field. Analyses are often partial and inconsistent with findings based on inadequate corpora, which are taken for granted and used to formulate unwarranted generalisations. There is also disagreement, and at times opposing views, on such fundamental aspects as the very notion of specialized discourse. For some authors it is based on a set of common features and forms an expressive resource separate from general language; for others its distinctive traits are negligible compared to similarities with the constituents of general language – to the point of denying any formal difference between the two. Some linguists have criticised the excessive selectiveness of specialized discourse, which makes it incomprehensible to the layman, while others consider formalisation fundamental to its nature – a 'legitimate privilege' (Weinrich 1985) of any disciplinary code.

The wider public viewpoint reflects the same contradictions: on the one hand specialized discourse is criticised for its obscurity and complexity, on the other hand it is treated with deference and its prestige is confirmed by the widespread tendency to quote technical terms, sometimes even inappropriately. This phenomenon has attracted the attention of copywriters, who exploit our passion for technical jargon by peppering advertising messages with specialized terminology in order to increase persuasiveness. The use of specialized discourse makes the addressee attach greater objectivity and truthfulness to a given text.

Another disagreement in the literature on specialized discourse regards the relevance of data and the possibility of generalising its findings. Once again there are different, and at times opposite, view-

points: some treat specialized languages as though they formed a homogenous entity sharing the same phenomena and principles; others argue that a single approach is impossible, as specialized languages must be taken into consideration separately or grouped by level, genre, etc. The latter view is arguably confirmed by the findings of several studies and authors working with different texts, fields and specialized genres. The results drawn from one field cannot *per se* be extended to others; the findings for a given genre call for adjustment and additions if applied to another.

A similar difference of views is found as to the international relevance of such phenomena. Many studies focus on a single language (e.g. French in business communication, English for air-traffic control, German for mechanical engineering, etc.) while at the other end of the spectrum, scholars have also approached specific phenomena in a wider perspective, emphasising the increasing internationalisation of specialized terminology. In Western cultures, identical or similar terms tend to recur in different languages, as groups involved in a particular discipline rely on hybrid neologisms based on foreign lexis adapted to the phonology and morphology of the target language. Another flaw observed in the literature in this field is when features of general language or of the communicative context are classified as distinctive of a specialized variety. Various errors of this mistake are given in the first chapter of this volume.

The purpose of this book is therefore to review the various features of specialized discourse in order to assess its degree of specificity and diversification, as compared to general language. Prior to any analysis of such traits, the notion of specialized discourse and its distinctive properties should be clarified, also as compared to other features frequently occurring in specialized texts which cannot be considered distinctive. Whenever possible, the presence of such properties will be accounted for not only in linguistic but also in pragmatic terms (hence the preference for the term *discourse* rather than *language* to refer to the object of this analysis). Although aimed at a detailed and integrated analysis, this book does not advocate a unilateral interpretative model (which, as I argue, is untenable) but seeks to highlight the main constituent traits and generalisable features, without neglecting the peculiarities of individual disciplinary

fields. As far as possible, the approach will be interpretative rather than merely descriptive.

The complexity of this discourse calls for a multidimensional analysis, covering both lexis and morpho-syntax as well as textual patterning. Though targeted by separate chapters, such features are kept separate only for the sake of convenience; there is no doubt that they coexist and are closely interconnected, to the point that pragmatic, lexical, morphosyntactic and textual elements constantly influence one another as the discourse unfolds. These phenomena will therefore be approached in a mainly semiotic perspective, on the understanding that surface divergences point to, and are determined by, semantic-pragmatic variations. The differences observed between specialized languages and general language may therefore be viewed as evidence of markedness or foregrounding, as observed by Halliday:

> A text, as well as being realised in the lower levels of the linguistic system, lexicogrammatical and phonological, is also itself the realization of higher-level semiotic structures with their own modes of interpretation, literary, sociological, psychoanalytic and so on. These higher-level structures may be expressed not only by the semantics of the text but also by the patterning at these lower levels; when such lower-level patterning is significant at some higher level it becomes what is known as 'foregrounded'. Such foregrounded patterns in lexicogrammar or phonology may be characteristic of a part or the whole of a text, or even of a whole class or genre of texts. (Halliday 1978: 138-139)

Many phenomena are well-known and have been discussed in earlier publications. The contribution of this book is to offer an integrated overview of the subject, with an account of its underlying motives. The lexical, morphosyntactic and textual features of specialized discourse have often been presented in purely descriptive terms, with no explanation of the forces which produced them. Though centred on qualitative analysis, reference will also be made to quantitative data for statistical assessment of the phenomena concerned. Such data will at times be included to highlight the significance and stability of a given phenomenon. Quantitative analysis always calls for caution because of its limited interpretative use, but no one can deny that it yields valuable data as to the dimensions of phenomena, provided

these are integrated by research into its semantic and pragmatic roots. I am in complete agreement with Halliday's view:

> A distinctive frequency distribution is in itself no guarantee of stylistic relevance as can be seen from authorship studies where the diagnostic features are often, from a literary standpoint, very trivial ones. Conversely, a linguistic feature that is stylistically very relevant may display a much less striking frequency pattern. But there is likely to be some quantitative disturbance if a particular feature is felt to be prominent; and therefore, a few figures may be very suggestive. [...] A rough indication of frequencies is often just what is needed, enough to suggest why we should accept the writer's assertion that some feature is prominent in the text and to allow us to check his statements. The figures, obviously, in no way constitute analysis, interpretation or evaluation of style. (Halliday 1973: 116-117)

The following analysis is therefore linguistic and not content-oriented, though at times it takes into account the epistemological theories used by specialists to explain certain options in the patterning of discourse. Indeed, there is a close link between the epistemological framework underlying each field and its realisation through language. For this reason, whenever possible, I shall also take into account the metalinguistic resources deployed in specialized texts (highlighting any explicit reference to specialized discourse) and in monographs written by scientists targeting the relationship between disciplinary epistemology and specialized language.

The texts taken into consideration are those employed by specialists to communicate with their peers; they do not include popularisations or textbooks, which serve other communicative purposes and follow linguistic-pragmatic criteria different to those of genuine specialized texts.[1] This exclusion is justified by the close link between a text's macrofunction, genre and linguistic realisation. The main objective, therefore, is to identify the distinctive traits of specialized discourse, which do not necessarily depend on a specific linguistic code, though the emphasis (for exemplification and in the bibliography) is on English in particular. At times, however, examples will be given for other languages, so as to give a deeper perspective of the phenomena considered. For a comparison between the features

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1   However, some features of the language of popularisation are presented in
        Chapter 8.

observed in different specialized languages, equal space will be given to several disciplines across the spectrum.

Some of the issues raised here have been central to my research in recent years and have been discussed in various seminars and conference presentations. A certain degree of overlapping between parts of this volume and earlier publications is therefore inevitable. Nevertheless, any point covered elsewhere has been revised in accordance with the book's overall approach. In particular, this is an abridged version of Gotti (2003), which was favourably welcomed both by scholars and by students. The version presented here – which is shorter, and therefore less expensive – should be particularly suitable for pedagogic purposes.

Linguistic Features

I. Defining the Notion of 'Specialized Discourse'

Interest in specialized discourse dates back to the early decades of linguistic investigation.[1] In the 1920s-1930s, scholars belonging to the Prague school turned their attention to the so-called 'functional style' which characterises scientific and technical discourse (cf. Fried 1972). At first, their approach was conservative, since it tended to classify such discourse at a lower level, totally separate from the language of everyday use. Scholars sought above all to produce clear-cut definitions of the differences between specialized and general discourse:

> Differences between current English and technical English can be found at all linguistic levels and they manifest themselves in a different way both qualitatively and quantitatively. (Bares 1972:129)

Yet the specific features of word morphology (foreign words retaining their original plural suffix, obsolete forms of verbs and adjectives) and formation (the use of typically classical prefixes, certain types of nominal premodification) pointed out in those studies are not limited to scientific or technical discourse, though they certainly occur more frequently and regularly in such varieties.

Research into the concept of 'register' published after the Second World War attempted to identify the morphosyntactic, lexical and stylistic features that characterise specialized discourse. Studies on register analysis were part of a wider enquiry into language varieties – an enquiry inspired by a new perspective on linguistic phenomena. The transition from an uncontextualised view of language, typical of the Chomskyan tradition, to its perception as a highly flexible means of communication employed in different

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1   It is not my aim to provide a detailed history of language variation and description; only the stages functional to my argumentation will be mentioned here. For a more complete overview of the development of the studies on this subject cf. Bhatia (2002).

situations placed the study of specialized discourse within the wider spectrum of situational-contextual varieties. The view taken by such studies has led to several taxonomies and typologies seeking to isolate the distinctive features of each situational variety (cf. Brook 1973, Bolinger 1975 and Gregory / Carroll 1978); in particular, they focus on the link between the receiver and the type of communicative or social relationship established, while highlighting the synchronic varieties shaped by geographic, social or situational factors. Here a number of 'subcodes' are seen to be at work, i.e. situational varieties specifically correlated to the topic of communication and to the approach chosen by a determined 'community' of users. Register studies by British linguists often signal a keen interest in the autonomy of specialized discourse as compared to general language; their interest in marked / unmarked forms is linked to the Firthian assumptions underpinning such studies, as shown by the following citation:

> A restricted language serves a circumscribed field of experience or action and can be said to have its own grammar and dictionary. (Firth 1957 quoted in Gregory / Carroll 1978: 26)

Without taking quite such a clear-cut view, register analysis turned its attention to the description of any feature that diverges from the default level of common language. Scholars generally concentrated on the lexical dimension, which is clearly the most marked, also in response to the recommendations of such pioneers as Halliday, McIntosh and Strevens:

> Some lexical items suffice almost by themselves to identify a certain register: 'cleanse' puts us in the language of advertising, 'probe' of newspapers, especially headlines, 'tablespoonful' of recipes or prescriptions, 'neckline' of fashion reporting or dressmaking instruction. (Halliday *et al.*, 1964: 88)

As we shall see later in this book, however, there is far more than a straightforward lexical distinction at the root of specialized discourse. The mere identification of marked elements is not enough to account for their origin or for the rationale which has led to their appearance. Register analysis has helped, on the other hand, to shift the researchers' focus from a chiefly statistical-quantitative approach

(which continues to this day, also thanks to digital word-processing technology) to a mainly 'qualitative' approach, which seeks to identify the peculiarities of specialized texts in a perspective that is not only microlinguistic but takes into account the discourse in which they are embedded.

The last few years have seen the appearance of a great many articles and books that highlight all types of detail in various disciplinary fields and at every level of linguistic analysis. Sometimes, however, phenomena classified as distinctive of specialized discourse have turned out not to be so. An example of this analytical error may be found in research on the phonetics of specialized discourse (see, for example, Gaultier / Masselin 1973), which draws attention to difficulties experienced by speakers in the pronunciation and comprehension of specialized lexis of classical or foreign origin. Yet these features cannot be linked to specialized discourse as such, but rather to the limited competence of speakers and their poor knowledge of foreign or classical languages, which causes problems also in the pronunciation and oral comprehension of foreign or classical words occurring in everyday language.

At other times the analysis of a given register relies instead on parameters which are alien to the linguistic domain under investigation. This, for instance, is the mistake made by Charrow when, in order to define the registral status of legal language, such non-linguistic criteria as the number of users and its mode of acquisition are drawn on:

> It is not a register, as only a small proportion of the population controls it, and it is acquired only through a very special type of schooling. (Charrow 1982: 82)

It also occurs that specialized languages are often assigned certain features which do not qualify them as subsystems but as varieties stemming from other factors within their sociolinguistic setting. This is the case, for instance, of the omission of contracted forms in English technical language (cf. Sharma 1978), which is due not to its being a specialized type of discourse as such but rather to the formal variety employed in most written texts. This, of course, does not imply that several features (in this case those of a specialized language and a

formal variety) cannot coexist within the same text – a common scenario, considering the great number of different factors at play in a communicative situation. What matters is that no confusion is made between the distinctive elements of specialized discourse and features due to other factors.

Indeed, the communicative situation combines several contextual factors, making it difficult to attribute a given linguistic peculiarity to a single originating factor. This awareness has led to the identification for each specialized language of textual genres linked to sets of consistent features. For the same reason, many scholars have tried to group together the contextual factors capable of identifying the parameters which distinguish different genres within a specialized language. Thus, for legal language, Danet (1980) adapted Joos's (1961) stylistic categories for degree of formality to the different modes of text production (distinguishing between WRITTEN and ORAL, with the former subdivided into COMPOSED and SPONTANEOUS). By this route she developed a sociolinguistic scheme for the genres of legal language (cf. Table 1).

STYLE				
Mode	*Frozen*	*Formal*	*Consultative*	*Casual*
Written	Documents: Insurance policies Contracts Landlord-tenant leases Wills	Statutes Briefs Appellate opinions		
Spoken-composed	Marriage ceremonies Indictments Witnesses' oaths Pattern instructions Verdicts	Lawyers' examinations of witnesses in trials and depositions Lawyers' arguments, motions in trials Expert witnesses' testimony	Lay witnesses' testimony	

Spoken-spontaneous			Lawyer-client interaction Bench conferences	Lobby conferences Lawyer-lawyer conversations

Table 1. Danet's (1980: 471) sociolinguistic scheme for legal genres.

As can be seen in Table 1, there are genres – e.g. wills, contracts and insurance policies – which combine highly formal traits with features typical of the written mode. Others, although written (e.g. statutes, briefs, appellate opinions) exhibit a lower degree of formality, on a par with that of witness examinations and motions, which belong to the oral mode. Also oral texts, however, may contain highly formal traits, as observed for example in verdicts, wedding vows, oaths and indictments.

These genres are highly codified and typically exhibit standardised, easily predictable sentences, often amounting to formulaic expressions. There are also less predictable genres, however, which allow for a greater degree of spontaneity and variation, both in content and expressiveness. They are usually oral and take on different levels of formality: higher in witness examinations or expert statements, lower in non-expert statements and client-lawyer conversation, right down to the informality of private conversation between lawyers.

This interrelationship between various contextual factors has led scholars to examine specialized discourse according to a coordinate system with a horizontal dimension concerning the disciplinary domain dealt with (e.g. economic discourse, legal discourse, scientific discourse, etc.) and a vertical dimension relating to its sociological 'layer' (e.g. its degree of formality and functional style). Such a coordinate system is illustrated in Figure 1.
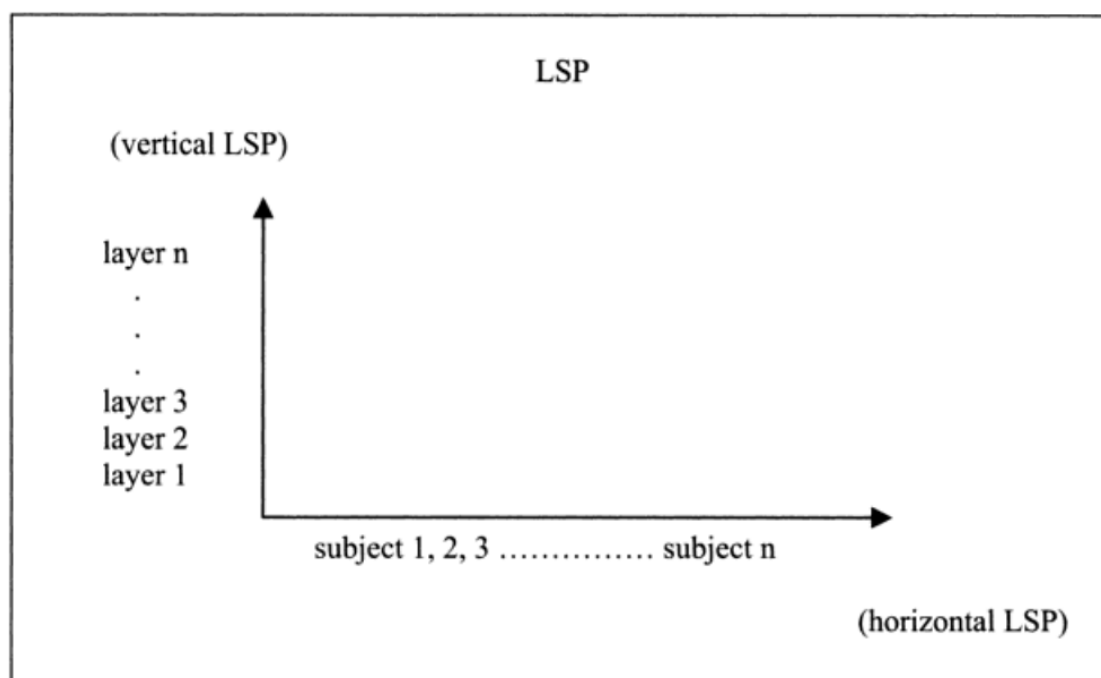
Figure 1. Coordinate system for the representation of specialized discourse (From Trosborg 1997: 16)

1. The issue of terminology

Another controversial aspect which still seeks consensus by scholars investigating specialized discourse is the term used to define its object. Different expressions are commonly used to denote this variety of use, but they are not all equally acceptable – especially when they refer to something beyond their object of study. The choice of terminology may appear secondary but is in fact central, because of the close link between term and referent which also reflects different ways of looking at language from a theoretical standpoint. Sometimes specialized discourse has been thought comparable to the notion of 'restricted language' (Wallace 1981), although the term is applied in particular to restricted codes that employ certain sentences of general language in specialized communication. This is the case, for example, of flight control communication, based on the exchange of standard messages using set phrases with a set of agreed variants (cf. Dodson

1974). Such instances, however, are rather rare and the terms 'restricted code' and 'specialized discourse' are not interchangeable because the latter exploits the language code in a far more creative and varied way.

Elsewhere the term 'special languages' has been used, but this should denote languages with special rules and symbols deviating from those of general language. An example in this class is Code Q, which is frequently used in the telecommunications sector. But here the code for communication is non-linguistic; even though it involves numbers and punctuation marks borrowed from language, it follows totally independent conventions. A few messages expressed in this code may help to clarify its nature (the translation of the messages into English is given in parenthesis):

(1)   - QOB?   [Can you communicate by radiotelephony (2182 kHz)?]
      - QOC   [I can communicate by radiotelephony (channel 16 - 156.80 MHz).]
      - QOD5? [Can you communicate with me in Italian?]
      - QOD1   [I can communicate with you in English.]
      - QOF?   [What is the commercial quality of my signals?]
      - QOF3   [The quality of your signals is commercial.]
      (*Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services*, Geneva: General Secretariat of the International Telecommunication Union, 1976)

Arguably, the term 'special language' could also be applied to languages sharing the communicative conventions of a given language but also possessing other conventions which are not part of these resources.

For the sake of terminology, therefore, the terms 'special languages' and 'specialized discourse' should be kept separate because, as we shall see below, the latter is distinguished from general language not for its use of special linguistic rules absent from general language but for its quantitatively greater and pragmatically more specific use of such conventions.

The term 'microlanguage', often employed in specialized discourse studies, is also inappropriate for its reference to a microcosm lacking the expressive richness of standard language. Specialized discourse does not appear to share the constraints and

simplifications assumed by some authors but possesses all the lexical, phonetic, morphosyntactic and textual resources of general language. Such resources are commonly employed (and sometimes even hyper-employed) in the construction of specialized texts.

I shall therefore adopt the expression 'specialized discourse', which reflects more clearly the specialist use of language in contexts which are typical of a specialized community[2] stretching across the academic, the professional, the technical and the occupational areas of knowledge and practice. This perspective stresses both the type of user and the domain of use, as well as the special application of language in that setting. For specialized discourse to develop, all three of these factors need to be present.

Instead the emphasis has often been placed on one factor alone, as in Halliday (1978) or Gregory / Carroll (1978), who subordinate the specificity of specialized discourse to their topic. They classify all registers according to three parameters: mode, field, and tenor. The first concerns chiefly the channel and medium of communication and the third the relationship between participants, while the second (field) regards the object of communication, i.e. its topic and everything related to it or to its realisation within the communicative event. However, the choice of specialized discourse is not determined solely by its topic, as shown in the following example:

(2)   PATIENT (to nurse): Good morning. I'm here to have my tonsils out.
       NURSE (to GP):   Doctor, there's a patient here for a tonsillectomy.

In this case the topic is the same, but is expressed through different linguistic options, especially at a lexical level. The use of specialized terminology depends on the speaker's profession (GP, nurse) and

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2   The concept of 'community' is crucial to the field of specialized discourse as the features and forms of specialized texts are recognized and shared by the members of specific professional groups. As Candlin / Hyland aptly point out, "individuals write as community members and the specific properties of writing are seen as reflecting, and in part constituting, the interactions between members of social groups" (1999:10). Several studies have recently investigated chosen forms of language and discursive practices in different specialized communities, such as Bazerman / Paradis (1991), Cicourel (1992), Porter (1992), Bazerman (1994), Prior (1998), Swales (1998), Hyland (2000), Poncini (2004), Cortese / Duszak (2005) and Trosborg / Jørgensen (2005).

presumed knowledge of lexis. This kind of use, linked to the interactants' profession, has often been classified (because of its degree of opacity) as jargon – indeed, Turner 1980 considers opacity the main feature of specialized discourse. But jargon avoids transparency in a deliberate attempt to make the message incomprehensible to outsiders, whereas in specialized discourse comprehension problems encountered by the uninitiated depend not only on unfamiliar lexis but also on conceptual content. Of course, there are cases of people using specialized terms to prevent others from understanding, but they remain the exception rather than the rule.

2. The multi-dimensional nature of specialized discourse

The world of specialized discourse is by no means as homogenous as it may at first appear. There is a clear distinction between different specialized languages, though any distinction based mainly on lexis is far too simplistic in this context. The following chapters explore the fact that disciplinary variation produces not only special lexical connotations but often also influences other options (morphosyntactic, textual and pragmatic), thus reflecting at the same time the epistemological, semantic and functional peculiarities of a given variety of specialized discourse. Specific use does not necessarily imply the presence of exclusive rules but it calls for appropriate analytical tools and caution is needed whenever the features observed in one specialized language are extended to others. Just as general language is not a uniform entity but contains many varieties, common rules and features of specialized discourse coexist with specific ones separating each variety from the others.

There is a further distinction to be made in the field of specialized languages – a distinction that cuts across each of them, determining its level of specialisation. As observed above, the mere presence of a specialist is not sufficient to ensure specialized use of a language, and this in turn is not limited to peer-communication alone. There are in fact three different situations in which a specialist may

address a topic relating to his profession. The first case is when the expert addresses other specialists to debate issues within his disciplinary field, to describe a research project, report results, explain the use of equipment, etc. If the addressees share a considerable amount of knowledge, the author can make frequent use of specialized terminology whose semantic value is taken for granted; the only words or phrases explained are those coined or re-defined by the author himself. Considering the small number of potential decoders of such specialized messages, some scholars even argue that they lack a communicative function. This is the opinion, among others, of Crystal and Davy, who claim that:

> To speak of legal language as communicating meaning is itself rather misleading. Of all uses of language it is perhaps the least communicative, in that it is designed not so much to enlighten language-users at large as to allow one expert to register information for scrutiny by another. (Crystal / Davy 1969: 193-4)

Despite its striking semantic opacity, there is no doubt that specialized discourse retains its essentially communicative function, which is an inherent quality of any type of text. This is even more crucial when (as in legal discourse) language codifies rights and duties, agreements and conventions among parties to a contract or a resolution.

The second case is when specialists address non-specialists to explain notions pertaining to their discipline. For educational purposes the meaning of specialized lexis is illustrated whenever it occurs for the first time. Typical texts of this nature are academic textbooks and instruction manuals.[3] The third case is when a specialist provides information of a technical nature mainly through everyday lexis, while drawing on the layman's everyday experience when a specialized concept is introduced. The purpose here is to reach out to a wider audience, as generally observed in newspaper or magazine articles presenting scientific or technical information (some of the features of this type of discourse are discussed in Chapter 8). These three

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3   These texts are the object of analysis of a particular branch of specialized discourse studies, i.e. those concerning Languages for Academic Purposes. For a presentation of the main research topics and methods in this field cf. Hyland / Hamp-Lyons (2002) and Del Lungo Camiciotti / Tognini Bonelli (2004).

situations lead to three different uses of language, or rather to three levels of specificity in language use, which Widdowson (1979) terms 'scientific exposition', 'scientific instruction' and 'scientific journalism'; it is clear, however, that only the first two involve a truly 'specialist' use of language.

Some authors (see for example Altieri Biagi 1974) also allow for a fourth level – the highest in the hierarchy – namely 'formalisation' or 'condensation into formulae'. There is a fundamental difference, however, between this level and the three previously mentioned, since it relies on non-verbal rather than verbal language. An example is the botanic formula for a flower cited by Altieri Biagi (cf. Figure 2):

$$\female \oplus K\,(5)\,C\,(5)\,AO + 5\,G\,(5)$$

Figure 2. Botanic formula for a flower (From Altieri Biagi 1974: 90).

This formula, which condenses the structural qualities of a hermaphrodite flower with a symmetric radial configuration, a five-sepal calyx, a five-petal corolla and five stamens, does not employ the conventions and elements of a verbal code but points directly to its own symbolic conventions. This distinction does not rule out the presence of a formalised level in specialized texts, nor does it disprove Altieri Biagi's observation that all scientific disciplines tend to adopt symbolic formulations, in a desperate attempt to steer clear of the connotative constraints of general language. The search for pure denotation, however, often leads specialists to avoid the verbal code, which is inherently polysemous. When combined with the inherent conciseness of specialized communication, this tendency generates a wealth of formulae, symbols, flow-charts, diagrams and other non-verbal conventional codes.

The constant presence of non-verbal elements in specialized texts led Widdowson (1979: 52) to speculate that they form the 'deep structure' of such texts – similar to a 'universal' knowledge-bank forming the basis of specialized discourse. He argues that when this

deep structure is textualised, it codifies into specialized discourse in the following manner (cf. Figure 3):

Scientific discourse

----------------------------------TEXTUALIZATION ----------------------------------

French	English	Japanese	Etc.
Scientific	Scientific	Scientific	
Text	Text	Text	
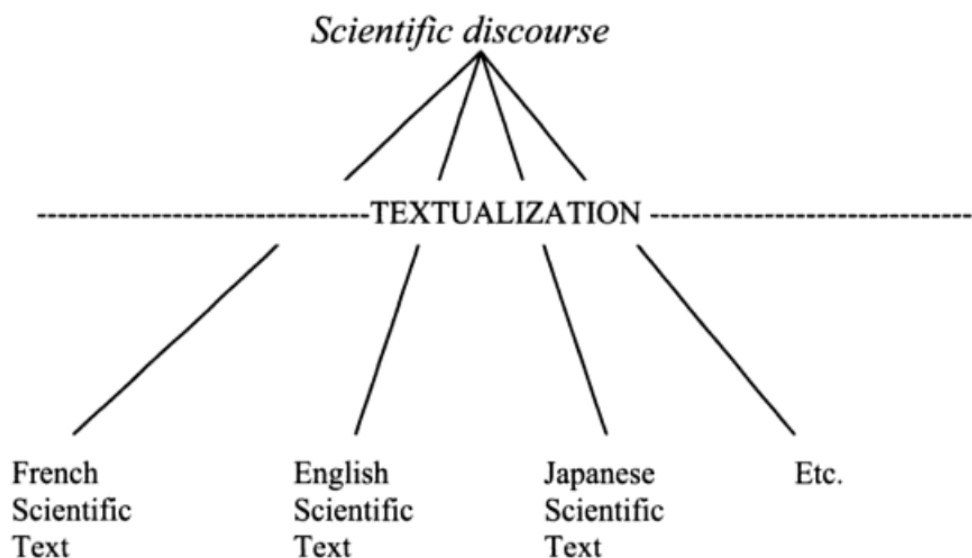
Figure 3. Widdowson's (1979: 52) diagram representing the 'deep structure' of specialized texts.

Widdowson includes non-verbal elements (formulae, diagrams, tables, etc.) in the deep structure of specialized discourse, on the assumption that they are 'universal' and independent of any single language. It is difficult, however, to accept this view because of the largely conceptual nature of non-verbal elements, which simply offer an alternative, non-linguistic representation of specialized notions. The aforesaid diagram could therefore be revised as shown in Figure 4.

3. General features of specialized discourse

The numerous partial analyses in this field are backed up by studies devoted to the general characteristics at the basis of specialized discourse. They concentrate particularly on the pragmatic criteria reflected in the various features of its varieties. Without attempting to provide a complete or detailed picture of all these studies, I shall mention two significant contributions to our understanding of the subject.

Specialized concepts

------------------------------TEXTUALIZATION ------------------------------

Verbal   Non-verbal

French   English   Etc.   Formula   Diagram   Etc.
Scientific   Scientific
Text   Text
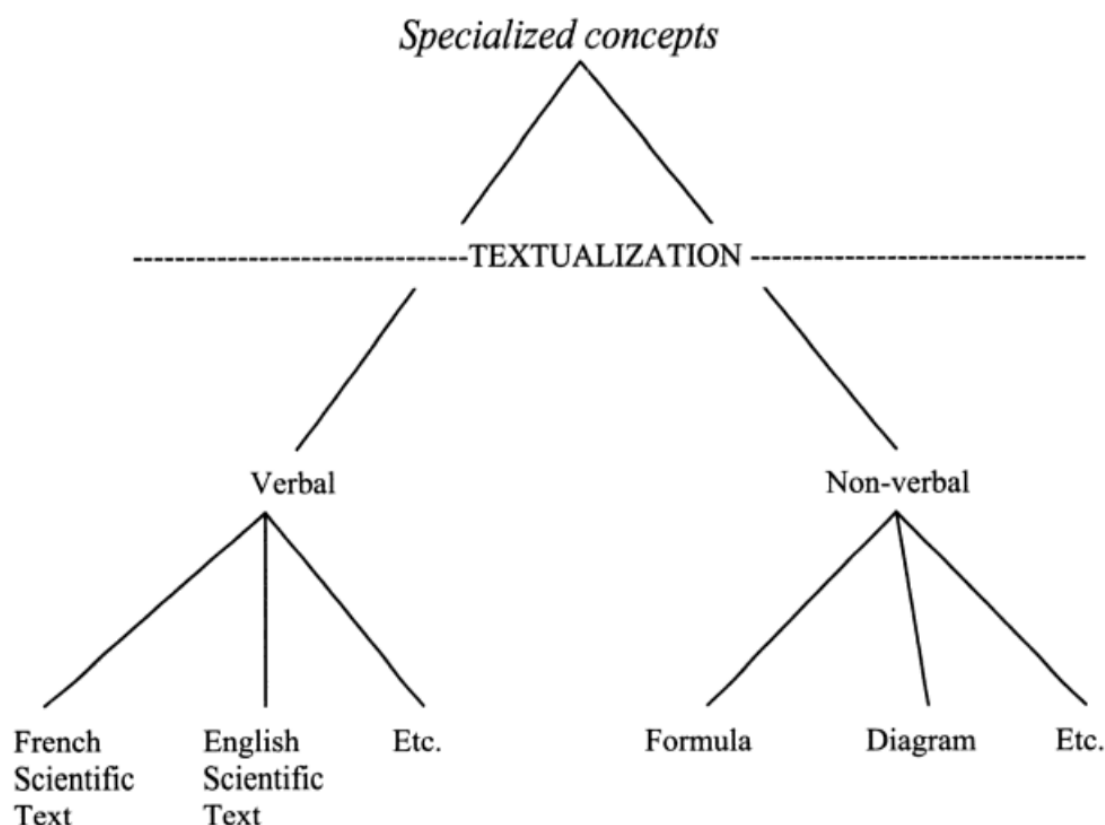
Figure 4. Revised diagram representing the 'deep structure' of specialized texts.

Hoffmann (1984) provides a long list of the desirable qualities of specialized discourse. In a concise form, he reviews eleven main points:

1. exactitude, simplicity and clarity;
2. objectivity;
3. abstractness;
4. generalization;
5. density of information;
6. brevity or laconism;
7. emotional neutrality;
8. unambiguousness;
9. impersonality;
10. logical consistency;
11. use of defined technical terms, symbols and figures.

Even without an analytic discussion or a full illustration of each feature, and despite certain flaws in its structure (some categories are not very consistent[4] while others are repeated[5]) this list offers a concise overview of the different points highlighted by various scholars. Its most obvious shortcoming seems to be the excessive generalisation of these criteria. As we shall see, not all the criteria mentioned by Hoffmann are applicable to all specialized languages, and likewise the criteria chosen for a given specialized language are not always applicable to its various genres. There are also inconsistencies in Hoffmann's criteria: the need for clarity may conflict with simplicity, the need for unambiguous expression may at times make it impossible to ensure conciseness or abstractness. Hoffmann's study does not discuss such conflicting links and fails to identify which criteria become dominant in a situation of conflict.

The issue is taken up, albeit briefly, by Sager *et al.* (1980) who hypothesise three main criteria governing the choices made in specialized discourse. They are the same criteria that inspire Shannon and Weaver's (1949) linguistic theory, with its emphasis on the need for accuracy in the conveyance of a message, precision in the linguistic signs employed to express the required meaning, and perlocutory effectiveness of the message for successful communication. Drawing on this model, Sager *et al.* suggest three dominant criteria in specialized discourse: i.e. economy, precision and appropriateness. These are considered interdependent, in that maximum communicative effectiveness is achieved when the requirements of all three are satisfied. Sager *et al.* aptly remark that the degree of interdependence varies according to the communicative situation. They also point out that these three criteria are inherent in the general language system and that their balance ensures maximum efficiency within the specialized communicative process. If conflict arises between the first two (economy and precision), the criterion of appropriateness becomes decisive:

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4   For example, as regards the first point, the criteria of exactitude and simplicity are not always easy to reconcile.
5   This is the case, for instance, of 'clarity' in the first category and 'unambiguousness' in the eighth.

> Appropriateness is the measure of the effectiveness of the intention as it is expressed and understood in a message and, at the same time, it arbitrates between precision and economy. It decides the amount and type of cognitive effort involved in a speech act and therefore influences the presuppositions that can be made about prior knowledge. It regulates the explicitness of the psychological intention and therefore influences the assumptions that can be made about the correct interpretation of the intention of text forms. (Sager *et al*. 1980: 323)

Sager *et al.*'s criteria constitute a landmark in interpretation because they approach language as the outcome of decisions and choices within a global semiotic dimension. They also emphasise the interrelationship between semantic and pragmatic requirements in the general language system to which specialized communication belongs. However, as this scheme borrows its principles from general linguistic theory, it is somewhat constrained and limited as a result. The first two criteria (economy and precision) are clearly subordinate, in terms of quantity and quality, compared to those actually governing the production of specialized discourse. A brief look at Hoffmann's taxonomy is sufficient to confirm this observation. Even the criterion of appropriateness – which admittedly draws attention to the pragmatic orientation of utterance production – remains trapped within a conceptual fuzziness that is observable also in general language (Sager *et al.* themselves recognize the 'elusive nature' of their appropriateness criterion). The aforementioned study represents, nevertheless, an interesting effort to move beyond the mere description of linguistic phenomena and offers a practicable approach to their interpretation. The following chapters will discuss which criteria seem to influence the expressive choices of specialists and, when conflict arises among such criteria, which of these are hierarchically dominant.

II. Lexical Features of Specialized Discourse

This chapter analyses the main lexical features of specialized discourse. In particular, it first reviews the findings of leading studies in the field, especially those employing controversial criteria or criteria that are not applicable to all specialized languages as such.

1. Monoreferentiality

The most widely-investigated distinctive feature of specialized lexis, as compared to general language, is monoreferentiality. The term 'mono-referentiality' is not used here to indicate that each term has only one referent, as words generally have several referents, but to signal that in a given context only one meaning is allowed. Indeed, specialized lexis stands out not only for its limited, highly specific occurrence but also for its semantic uniqueness: due to the 'protected status' (Pearson 1998) words acquire in specialized subject domains, denotation is prevalent and the meaning of specific terms may be inferred without reference to their context. Term and concept are related by a fixed 'defining agreement' (Bloomfield 1939: 48), whereby the term cannot be suitably substituted by a synonym but only by its definition or a paraphrase. Sinclair defines this 'terminological tendency'as:

> the tendency for a word to have a fixed meaning in reference to the world, so that anyone wanting to name its referent would have little option but to use it, especially if the relationship works in both directions. (Sinclair 1996: 82)

This means that every term signals a concept and effectively condenses the semantic value contributed by the defining process which generated it. The highly referential nature of terminology is a major advantage for conciseness (which, as discussed later, is another

fundamental criterion of specialized languages). As Naess rightly ob-
serves with regard to the defining process:

> The special merit of definition is not that it allows us to say more, but that
> because a *definiendum* is much shorter than a *definiens* and the latter contains
> a high level of preciseness, once having stated a definition we can express in a
> few lines what, without its help, would require many volumes. The relevance
> of this to the exact sciences, which are largely made up of definitions, should
> be obvious. (Naess 1966: 54)

The need for a single referent generally means that users are forced to
create new terms, rather than use existing terminology, in order to
define new concepts without ambiguity or misunderstandings. Piesse
summarises the prevalent rule among specialists as follows:

> Never change your language unless you wish to change your meaning, and
> always change your language if you wish to change your meaning. (Piesse
> 1987: 58)

Monoreferentiality is, of course, limited to the disciplinary field in
which a term is employed. It is not surprising, therefore, that
dictionaries list several definitions of the same term, each applicable
to a separate context. Each scientific field adopts its own
epistemology for theoretical speculation, and this implies specific
languages that sometimes contain lexical items occurring also in other
disciplinary contexts.

    The difficulty of substituting a term with its synonym has major
consequences for lexical choices made in the textualisation of
specialized discourse and produces a certain lexical repetition.
Consequently, while in literary texts the type / token ratio is around 1,
in specialized texts it drops to far lower values. According to a survey
of Russian specialized texts (Mitrofanova 1973, quoted in Nencini
Rotunno / Lasorsa Siedina 1988: 15), the ratio varies from 0.043 to
0.135, reaching the lowest values in theoretical mechanics and
biology. In technical jargon, specialized texts may therefore be classed
as lexically 'poor'. As a result, the number of lexical items found in
each specialized field is not particularly large. For example, as
observed by Mitrofanova (1973, quoted in Nencini Rotunno / Lasorsa
Siedina 1988: 15-16), the basic lexis of Russian theoretical mechanics

amounts to 480 words, which alone form up to 91% of texts in this discipline. Hoffmann (1979) confirms the dearth of specialized lexical resources (though his data reach higher figures) not only in Russian but also in French and English. As for English, Hoffmann claims that 85% of any medical text relies on the 1,178 most frequently-used medical terms, while the proportion is 86% of the 1,059 terms adopted in physics and 92% of the 1,114 in mathematics.

The relative dearth of lexical resources in each discipline is due primarily to the scientific community's effort to avoid alternative terms for the same concept. This need arose in the 17th-18th centuries in response to research by such pioneers as Galileo, Newton and Lavoisier. The pursuit of a perfectly biunivocal link between concept and language was so urgent in the 1700s that scientists in various parts of Europe sought not only to eradicate ambiguity from everyday language but also to create a new universal language unfettered by the historical and geographical constraints of each country and capable of expressing both clearly and directly the new concepts employed by the international scientific community. This effort induced, among others, John Wilkins (a founding member of the Royal Society) to write an entire treatise on the need for a universal language of learning: *An Essay towards a Real Character and a Philosophical Language* (for more details about this issue cf. Chapter 5).

2. Lack of emotion

Another feature of specialized languages highlighted in the literature is their lack of emotive connotations. Unlike words (which are often richly connotated), terms have a purely denotative function. The word *lion*, for instance, is generally associated with such qualities as fierceness, aggressiveness, pride, majesty, etc.; in specialized language these connotations are lost. For zoologists, *lion* means a specific feline species, in heraldry it is a conventional symbol used in coats of armour, and so on. The tone of specialized discourse is usually neutral, as its illocutionary force derives from the logical,

consequential arrangement of concepts and of supporting evidence rather than the use of emphatic language. The informative purpose of specialized language prevails over other traits (emotive, aesthetic and other) typical of general language, lending professional communication a seemingly cold and artificial tone. Moreover, as aptly observed by Johnson and Sager, the monoreferentiality inherent in the defining process of specialized terms maximises their semantic value, making emphasis redundant:

> In general reference, if a particular attribute is to be emphasized, the emphasis must be achieved by contextual contiguity, syntactic devices, additional reference, etc., but in special codes the emphasis is already present through prior delineation of the subspace, which effectively excludes all attributes (dimensions) which are not assigned by the social norm to the discipline. (Johnson / Sager 1980: 87)

It is evident that, lack of emotion prevails whenever a text is mainly informative. If the pragmatic purpose is persuasive (as for example in advertising messages or in argumentative texts), the emphasis on emotion surfaces also in specialized texts. This confirms the superiority of needs stemming from the pragmatic purpose of discourse, as encoded by linguistic choices made at the lexical, morphosyntactic and textual level.

3. Precision

Another characteristic of specialized lexis is referential precision. Every term must point immediately to its own concept. This requirement excludes the recourse to indirect reference systems in specialized communication, through such devices as euphemism. Also this phenomenon arose in response to the need for precision advocated by the scientific revolution of the 17th century. As evidence of the inappropriateness of euphemisms in legal language, reference may be made to the case mentioned by Pannick (1985) of a Cambridge don reported to the academic authorities for immoral behaviour towards a student. The complaint, however, was insufficient for the professor to

be charged, because of the euphemistic wording used by the authorities ("[She was] walking with a member of the University"). Despite their insistence that in academic circles the expression was an equivalent of the more overt form 'to be in company with an undergraduate for an immoral purpose', the court rejected the University's complaint on the grounds that 'to be walking with a member of the University' does not constitute a criminal offence under common law or any official law or explicit rule contained in the statute of the University. Despite the sworn statement made to the court by the Pro-Proctor of the University of Cambridge, confirming that the expression clearly referred to the professor's immoral behaviour (she was openly defined by the Pro-Proctor "to be a reputed prostitute"), the judge upheld the literal meaning of the complaint, acquitting the professor with the following motivation:

> Nobody would suppose that a person simply walking with a member of the University, who might be that member's mother, or sister, or wife, or friend, was guilty of an offence against the law which would justify the Vice-Chancellor in imprisoning him or her. (Pannick 1985: 135)

4. Transparency

Another important feature of specialized lexis is the possibility to promptly access a term's meaning through its surface form. This criterion was particularly valued by the French chemist Lavoisier, who developed a new naming system for chemical compounds to allow readers to immediately identify the nature of the compound concerned. The system reflects the author's globally coherent view of science and covers both its conceptual and terminological dimension. In his preface to the famous *Méthode de Nomenclature Chimique* (1787), co-authored with G. de Morveau, C.L. Berthollet and A.F. Fourcroy, Lavoisier remarks that every science comprises three elements: a body of facts, the ideas based on these facts, and the words used to express such ideas. As an idea should refer directly to the facts observed, likewise the terms used should immediately

suggest the idea they express. Under this coherent system, built on three closely-linked elements, nomenclature has to convey facts and ideas precisely – indeed, almost graphically – without any additions or deletions.

The use of mostly Greek-based suffixes dates as far back as the Middle Ages and the Renaissance, although the best choice when coining a neologism was often a matter of the author's personal preference. Under Lavoisier's reform, each suffix was assigned a precise meaning that allowed a functional distinction of similar terms (e.g. *nitric acid* and *nitrous acid*, *sulphite* and *sulphate*) and clearly established the physical properties shared by compounds employing the same suffix. This change introduced a systematic order to specialized knowledge, whilst providing rules of terminological development not only for the redefinition of known elements but also for naming new elements as they were discovered. Before Lavoisier's reform, terminology was coined according to divergent criteria, based on such arbitrary assumptions as reference to the element's appearance, the name of its originator and its possible applications. As an example, one may compare the following chemical terms before and after publication of Lavoisier's treatise: *blue vitriol* (*copper sulphate*), *Rochelle salt* (*potassium sodium tartarate*), *salt of wormwood* (*potassium tartarate*), *tartar emetic* (*potassium antimony tartarate*) (examples from Hogben 1969: 29).

A similar attempt was made in Linnaeus's *Systema Naturae*, published in 1737, which divided the natural world into three main categories (animal, vegetable, mineral), each comprising separate groups and subgroups (e.g. genera, orders, classes) divided according to clear, coherent criteria signalled by Latin or Greek terms. The frequent use of classical words in science reflects the widespread effort of 18th century scientists to avoid the lexis of general language, prone to dangerous misunderstandings and ambiguities associated with everyday use. By drawing their lexical repertoire from two dead languages, scientists could redefine the natural elements with univocal meanings, free of the polysemy so common in a living language.[1] The

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1   A confirmation of the advantage offered by the use of Latinate terminology can be found in the following remark by Jacob Berzelius (1779-1848), one of the creators of the nomenclature of chemistry: "Learned men need expressions

value of Linnaeus's nomenclatory system is confirmed by its integral application to the present day, not only for terminology but also for defining new items. An example of this is the surviving use of the suffix *-ptera* proposed by Linnaeus for each order of insects: *Coleoptera, Hemiptera, Lepidoptera, Neuroptera, Hymenoptera, Diptera.*

A considerable advantage afforded by this kind of system is its extension of the principle of transparency also to other fields (such as medicine) where the separate lexical components of a specialised term can easily be decoded to reconstruct the meaning of the whole word. Thus, there is a correlation between the qualitative and quantitative aspect, with each adjunct to the lemma signalling also a semantic addition. The convenience of this system for lexical formation is illustrated by the following example: when processing the term *gastroenterology*, we recognise its components *gastro*, *entero* and *logy*, which in turn point to three semantic equivalences: *gastro* = stomach, *entero* = intestine, *logy* = study. By joining these part-meanings together, the overall meaning of the term *gastroenterology* is identified as 'study of the stomach and intestine'. The composite organisation of specialized languages is noticeable not only in their highly codified terminological formation but also in the arrangement of words. Biology, for example, has taxonomies constructed along clearly-defined lines, whereby each item is generally classified by two terms: the first for its genus, the second for its species (e.g. *Felis leo*, *Homo sapiens*).

One of the most widely employed devices ensuring transparency in specialized discourse is the use of conventional affixes, which have acquired precise values in each discipline as a result of the aforementioned systematisation and standardisation process. The structure of such affixes regulates the cataloguing of terms in logical categories but also allows (and fosters) the enlargement of each category within an open system that is both highly organised and codified. In such disciplines as chemistry, medicine and mineralogy suffixes have a clearly-defined meaning. For example, in chemistry or

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common to many languages even if they use their local ones. Due to the use of Latin expressions in the nomenclatures, terms become stable and are used in the same way by different authors." (Quoted in Laurén 2002: 92)

mineralogy the suffix *-ite* denotes derivatives of other elements – usually mineral compounds (e.g. *magnetite, calcite, fluorite*). These examples show that despite the process of simplification and rationalisation, certain suffixes retain more than one meaning and function. Their polysemy originates from the incomplete re-organisation of defining processes in each discipline and from the constantly evolving nature of scientific knowledge, which is often so rapid that there is no time to develop new linguistic tools suited to the purpose; in such cases, rather than create new items, existing lexemes are often assigned new meanings and functions.

5. Conciseness

Another highly-regarded criterion applied to word-formation by specialists is conciseness, which means that concepts are expressed in the shortest possible form. The need for conciseness generally leads to a reduction in textual surface, as for example in zero derivation (far more frequent here than in general language), which allows the omission of affixes. Examples in Italian are: *saldo* from *saldare*, *convalida* from *convalidare*, *utilizzo* from *utilizzare*, *rimborso* from *rimborsare*, and so forth.

Another neological process in this class is the merging of two lexemes into a single term. Possible instances include the Italian *informatica* (a loan translation of the French *informatique*, which in turn contains the two lexemes *information* + *automatique*) and *telematica*, produced by the merging of *telecomunicazione* and *informatica*. In other cases, greater conciseness is achieved through reduction of the term itself, either internally (cf. *urinalysis* is a reduced form of *urinoanalysis*, and *contraception* of *contra-conception*) or terminally (e.g. *haemostat* for *haemostatic forceps*).

Another type of conciseness device observed in specialized languages is juxtaposition, which omits prepositions and premodifiers in nominal groups containing two nouns. Italian examples are *estratto-conto*, with omission of the preposition + article *del*, and the term

analista-programmatore, which concisely denotes an analyst who also works as a programmer.

Sometimes conciseness in specialized discourse relies on acronyms and abbreviations. An example of this are sentences used in oral medical texts: "We had a DOA last night" (= dead on arrival), "He entered in a bad DKA" (= diabetic ketoacidosis), "[I'm giving the patient] oids" (= steroids / corticosteroids), "Was this man anemic PTA?" (= prior to admission) (examples from Christy 1979).

6. Conservatism

As mentioned earlier, one of the main principles asserted by 17th-18th century scientists was the need to redefine specialized concepts and replace existing (often imprecise or synonymous) terms with new ones, usually drawn from classical languages for greater mono-referentiality. The same innovative thrust is not found, however, in all fields of knowledge. For some, such as the law, the trend is, instead, intensely conservative. Fear that new terms may lead to ambiguity favours the permanence of traditional linguistic traits, which are preserved even when they disappear from general language. Old formulae are preferred to newly-coined words because of their century-old history and highly codified, universally accepted interpretations. Conservatism of this type accounts for the custom of opening the preface to many English legal texts with the conjunction *whereas*. This conventional signal parallels the use of *cum, quum, quandoquidem* and *quoniam* in Latin legal texts, or of *là* and *où* in French legal texts. The reverence for tradition observed in legal language is also due to its close link with the ancient practice of using special formulae for oaths or appointments, for drafting edicts and statutes, for issuing laws, conferring honours or assigning property. In this context, formulaic language is used to ensure the action's validity.

An amount of conservatism is also found in business language, where a number of age-old terms and expressions may still be encountered and have not been replaced because their meaning is

crystallised and widely accepted across the discourse community. In shipping contracts, for instance, the term *bill of lading* includes an antiquated form of the modern word *loading*, which has survived to this day only in this kind of document.

Some disciplines are conservative to the utmost degree, producing a language whose subservience to tradition leads to empty archaic formulae. An example of this in legal lexis are the antiquated forms *whosoever, wherefore, thereof, forthwith, henceforth, theretofore, hitherto*, etc. and lexemes which have disappeared from general language, such as *expiration, terminate, deem, upon*. The archaic nature of legal discourse is also seen in the use of third-person singular *-eth* with the present indicative of verbs (e.g. *witnesseth* instead of *witnesses*) that in modern English bear the morpheme *-(e)s*. A similar case is the obsolete auxiliary form *doth* instead of its modern equivalent *does*.

6.1. Reforming legal discourse

Legal discourse has often been criticised, even by legal experts. Sometimes it has attracted fierce condemnation, like Francis Bacon's reference to its "prolixity [...] tautologies and impertinences" (cited in Mellinkoff 1963: 193) or Jeremy Bentham's deploration of its extreme "voluminousness, indistinctness, and unintelligibility" (Bentham 1843: 332). Criticism of legal language is found also in literary works, which often convey an extremely negative view of legal argumentation. In *Utopia*, for instance, Thomas More has no place for lawyers in his ideal world, because they are "a sort of people whose profession is to disguise matters" (cited in Mellinkoff 1963: 202). Even worse is Jonathan Swift's opinion of the profession described in *Gulliver's Travels*:

> I said there was a Society of men among us, bred up from their Youth in the Art of proving by words multiplied for the Purpose, that White is Black, and Black is white, according as they are paid. [...] It is a Maxim among these lawyers, that whatever hath been done before, may legally be done again: And therefore they take special care to record all the Decisions formerly made against common Justice and the general Reason of mankind. These, under the name of precedents, they produce as Authorities to justify the most iniquitous

Opinions; and the Judges never fail of directing accordingly. [...] It is likewise to be observed, that this Society hath a peculiar Cant and jargon of their own, that no other Mortal can understand, and wherein all their Laws are written, which they take special Care to multiply; whereby they have wholly confounded the very Essence of Truth and Falsehood, of Right and Wrong. (Swift 1726 / 1947: 295-7)

Many magistrates and legal experts now advocate an end to the use of archaic formulae and obsolete lexis. Judge Staughton (1987, 1988), for instance, has written articles in legal journals urging his colleagues to abandon the use of certain lexemes (e.g. *verily, crave, learned*) which have lost their original semantic value, becoming either redundant or inaccurate in referential denotation. His reforming zeal is reflected in the following statement:

Could 1987 be the year in which advocates in court and those who swear affidavits say what they mean, in language which ordinary people can understand and without conscious archaism? (Staughton 1987: 50)

The need for reform in legal language is especially felt as regards interpretative difficulties of statutes and circulars, which target not only specialists but also the general public. In the 1970s, this need gave rise in the United States to the Plain English Movement, whose efforts to obtain a reform of legal language eventually convinced President Jimmy Carter to issue guidelines for the use of "clear and simple English" in all government regulations. This change in language use was not limited to government documents but soon spread to other public and private organisations, such as banks and insurance companies, which thoroughly revised the standard expressions allowed in their forms and contracts. The following paragraph is taken from a sample contract for a bank loan before (TEXT A) and after (TEXT B) the redrafting process (from Charrow / Crandall 1978):

(1)   TEXT A

In the event of default of this or any other obligation or the performance or observance of any term or covenant contained herein or in any note or any other contract or agreement evidencing or relating to any obligation or any collateral on the borrower's part to be performed or observed; or the undersigned borrower shall die; or any of the undersigned become insolvent or

make assignment for the benefit of creditors; or a petition shall be filed by or against any of the undersigned under any provision of the Bankruptcy Act; or any money, securities or property of the undersigned now or hereafter on deposit with or in the possession or under the control of the Bank shall be attached or become subject to distraint proceedings or any order or process of any court; or the bank shall deem itself to be insecure, then and in any such event, the Bank shall have a right (at its option), without demand or notice of any kind, to declare all or any part of the obligations to be immediately due and payable, whereupon such obligations shall become and be immediately due and payable, and the Bank shall have the right to exercise all the rights and remedies available to a secured party upon default under the Uniform Commercial Code (the 'Code') in effect in New York at the time and such other rights and remedies as may otherwise be provided by law.

(2)   `   TEXT B

I'll be in default:
(1) If I don't pay an installment on time; or
(2) If any other creditor tries by legal process to take any money of mine in
     your possession.

Apart from the many syntactic and textual transformations observable in this example, for which the reader is referred specifically to the next two chapters, there are also lexical changes affecting such obsolete terms as *distraint*, *assignment* (meaning a 'transfer of rights, stock or interest'), *note* (meaning 'contract'), *attached* (meaning 'seized') and *insecure* (meaning 'uncertain of repayment'), which are replaced by the more familiar *installment*, *creditor*, *take money*, *possession*.

In order to implement this Plain Language policy, several official guidelines have been drawn up to make public documents easy to read and interpret. Here, for instance, are some requirements specified by a recent Pennsylvania law:

(1) The contract should use short words, sentences and paragraphs.
(2) The contract should use active verbs.
(3) The contract should not use technical legal terms, other than commonly
     understood legal terms, such as 'mortgage', 'warranty' and 'security
     interest'.
(4) The contract should not use Latin or foreign words or any other word
     whenever its use requires reliance upon an obsolete meaning.
(5) If the contract defines words, the words should be defined by using
     commonly understood meanings.

(6) When the contract refers to the parties to the contract, the reference should use personal pronouns, the actual or shortened names of the parties, the terms 'seller' and 'buyer' or the terms 'lender' and 'borrower'.

(7) The contract should not use sentences that contain more than one condition.

(8) The contract should not use cross references, except cross references that briefly and clearly describe the substances of the item to which reference is made.

(9) The contract should not use sentences with double negatives or exceptions to exceptions.

   (*Pa. Stat. Ann.* tit. 73, § 2205(b), 1997 quoted in Tiersma 1999: 224)

This reforming movement has been so strong in the United States that it has inspired similar movements in other countries for clearer language in the drafting of government circulars and statutes (cf. Staminesco 2002 for France; Wieners-Horts 2002 for Germany; Murgia / Rizzoni 2002 for Italy; Danet 1980 for Norway; Asprey 1991 and Ehrenberg-Sundin 2002 for Sweden; Asprey 1991 for the United Kingdom; Asprey 1991 for Australia, Canada, Denmark, India, New Zealand and South Africa). Indeed, it is in the field of business and governmental documents that the simplifying and reorganising action of the Plain Language Movement has been more successful (cf. Danet 1990). Instead, despite continued efforts by reformers, changes to legal language have been few and far between.[2] The survival of archaic linguistic forms has been attributed, among other things, to the use of standardised formulae as a convenient smokescreen for law-makers and lawyers unwilling to relinquish the "comforts of precedent" (Procaccia 1979). Even less noble motives are alleged to bolster the conservatism and imprecision of legal language, which increases the amount of speculation (and work) for legal practitioners. An example of this is Danet's view that:

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2   For example, a year after having put forth his proposals, Staughton had to admit that they had found scarse support in the legal circle: "Fifteen months ago I suggested a New Year's resolution for those who draft affidavits – not to write that the deponent believes anything *verily*. Some adopted it, but like most New Year's resolutions it has not proved to be of lasting effect." (Staughton 1988: 19)

> If legal language were always so precise, there would never be disagreements over the meaning of contracts, and people would never have to go to court to resolve their differences. (Danet 1980: 541)

Another, more ideological motive, is the preference of lawyers and law-makers for obscure legal language as a means to retain their power over ordinary citizens, relying on exclusive access to the hidden significance of laws and legal procedures. In this view, courtroom debates are in the hands of those proficient in legal jargon, which allows control of specialist knowledge and information. The picture is typical not only of legal practitioners but may be extended to other specialist fields (e.g. the master-servant relationship established by specialized language in doctor-patient interactions). As Bloch rightly argues:

> Because the formalization of language is a way whereby one speaker can coerce the response of another [...] it can be seen as a form of social control. (Bloch 1975: 20)

7. Ambiguity in specialized discourse

The survey of the literature on specialized discourse has enabled us to identify the main criteria which influence the creation of specific terminology. Our analysis of the texts taken into consideration, however, has highlighted several exceptions to those principles. For example, as regards the criterion of monoreferentiality, many texts show frequent violations to that principle, and the presence of many cases of ambiguity and polysemy. At times this ambiguity is not planned, but in other cases it is the result of the author's decision. This is, for instance, the position adopted by those economists who are against the use of a monoreferential type of language because of its excessive rigidness and its inability to describe complex phenomena in an adequate way. This linguistic view is a consequence of a clear methodological choice, which opposes a positivistic approach to economic epistemology. An exponent of this methodological stand is Keynes, who is convinced that:

too large a proportion of recent 'mathematical' economics are merely concoctions, as imprecise as the initial assumptions they rest on, which allow the author to lose sight of the complexities and interdependencies of the real world in a maze of pretentious and unhelpful symbols. (Keynes 1936 / 1973: 298)

What makes a formalized language inappropriate for the discussion of theoretical matters, not only in Keynes' principles but in economics in general, is that the univocal reference of each term in the vocabulary to a specified concept cannot take into account the need to give words different meanings in different contexts, and at different points in the procedure. Such a language can be useful only in those disciplines in which theoretical discussion does not call for multiple definitions of the concepts they employ. This does not apply to economics, where the complexity and interconnectedness of its parts do not permit atomistic analysis. As Keynes puts it:

It is a great fault of symbolic pseudo-mathematical methods of formalising a system of economic analysis [...] that they expressly assume strict independence between the factors involved and lose all their cogency and authority if this hypothesis is disallowed; whereas in ordinary discourse, where we are not blindly manipulating but know all the time what we are doing and what the words mean, we can keep 'at the back of our heads' the necessary reserves and qualifications and the adjustments which we shall have to make later on, in a way in which we cannot keep complicated partial differentials 'at the back' of several pages of algebra which assume that they all vanish. (Keynes 1936 / 1973: 297-8)

According to Keynes, translating thought into the precise and unequivocal terms of a symbolic-mathematical language is an obstacle to the further development of that thought itself, as the continuous conceptual changes require a more flexible expressive system allowing for a constant redefinition of the referents of the terms employed. This inadequacy induces Keynes to accuse symbolic-mathematic language of causing confusion and misunderstanding. As a matter of fact, the possible confusion does not derive from the specialized discourse employed – which, instead, is extremely precise – but from the fact that this instrument, which is typical of the positivistic sciences (where univocal reference to phenomena and concepts highlights the objective referential function), is used

(obviously, with unsatisfactory results) also for a non-positivistic science such as economics.[3]

The need to differentiate specialized disciplines into different kinds of sciences is also felt by Keynes himself, who is convinced that economics cannot be included in the category of the exact sciences but in that of the moral sciences.[4] In inserting economics in a particular specialized group, Keynes is aware that consistent linguistic consequences will be drawn from this choice, due to the strict relationship existing between the epistemological and the linguistic aspects of each discipline.

In his choice of everyday language, Keynes adopts the tripartite division proposed by Malthus (1827), who – in examining the definitional processes adopted in various specialized branches – identifies the definitional patterns employed in three main research fields: the mathematical sciences, the natural sciences and the moral sciences. Each type of science is characterised by a particular kind of language and therefore adopts its own definitional pattern.

In the moral sciences, the use a person makes of a certain term determines the meaning that he attributes to it. The author may base his definition on the existing meaning(s) of a specific term, but he may also provide a very idiosyncratic definition corresponding to his own view of the world. This 'nominal' definition confers the author's personal value on the term, which is then to be adopted by the interlocutor as a premise for the correct interpretation of the text. Indeed, as Mangler and Kessen remark:

> The fact that the reader may disagree with any or all of these definitions is not relevant to the use of nominal definitions. They are stipulations, often shorthand substitutions for more cumbersome expressions, and cannot be considered as either correct or incorrect. (Mandler / Kessen 1959: 92)

Moreover, if a clear interpretation of a text is to be guaranteed, the author should use his terms in a consistent way, making sure that there

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3   For a more detailed discussion of Keynes' views on the language of economics cf. Gotti (1994a).

4   Indeed, the concept of 'objectivity' of scientific research has been questioned by several scholars in recent years (cf. Bazerman 1984; Hunston 1993a, 1993b, 1994a; Myers 1989, 1990a; Thompson / Ye 1991).

is a constant reference of a specific *definiens* to the same *definiendum*. The specialist is not denied the right to redefine the value of some concepts or the meaning of some terms, especially when this redefinition is part of an innovative conceptual revision or the adoption of a new paradigm (cf. Kuhn 1962); however, in order not to give rise to misunderstanding or incomprehension, this semantic redefinition should be clearly stated, and terms should be used consistently with the new meaning(s) throughout the text.

8. Imprecision in specialized discourse

Despite the recurring claim that precision is a prominent feature of specialized discourse and one of its distinctive qualities, there are several exceptions to this rule in certain disciplinary fields. One of the least consistently precise areas is legal language, where terms are to a certain extent referentially fuzzy (cf. Bhatia *et al.* 2005): in particular, the use of adjectives sometimes allows subjective, if not arbitrary, interpretation. An example of this is the use of *proper* in the following legal clause taken from the contract in Appendix 1 at the end of this volume:[5]

(3)   The Tenant will [...] pay for [...] a proper proportion of the rental or other recurring charges to be assessed according to the duration of the tenancy (1: 40-47)

The text does not clarify what a *proper proportion* amounts to in monetary terms. Also the adjective *reasonable* below is indeterminate and allows for a highly personal evaluation of the subsequent noun:

(4)   reasonable wear and damage by fire [of the Fixtures Furniture and Effects] excepted (1: 56)

(5)   the reasonable use thereof nevertheless to be allowed for (1: 62)

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5   Thanks are due to Ms E. Welsh for her authorisation to reproduce the two legal documents shown in the appendices to this volume.

(6)   The Tenant will [...] permit the Landlord or the Landlord's agents at
       reasonable hours in the daytime to enter the Property to view the state and
       condition thereof (1: 40-64)

(7)   The Tenant will [...] permit the Landlord or the Landlord's agents at
       reasonable hours in the daytime within the last twenty-eight days of the
       tenancy to enter and view the Property with prospective tenants (1: 40-77)

9. Redundancy in specialized discourse

Some specialized languages contain instances of redundancy,
generally due to the pleonastic use of lexical items. This involves a
violation of the principle of conciseness (mentioned above as a
distinctive feature of specialized discourse), when the number of
lexemes employed is far higher than necessary. Legal language, in
particular, displays the highest occurrence of violations to the
principle of conciseness. Crystal and Davy's (1969) analysis of legal
discourse, for example, stresses the habit of English legal drafters to
employ two interchangeable terms for the same concept: e.g. *new and
novel, false and untrue, made and signed, terms and conditions, able
and willing*. Each of these pairs clearly consists of a neo-Latin term
coupled with an Anglo-Saxon parallel – a practice rooted in the age
following the Norman Invasion, when England had two spoken
languages: English (which accounts for the Anglo-Saxon term) and
Norman French. The naming of concepts through both languages
ensured comprehension by all sectors of the population (cf. Mathew
1938).
      Sometimes, however, lexical doubling involves the same
language and derives from its historical development, as in *null and
void* (both from French) or *without let or hindrance* (from Old
English) (for more examples cf. Hiltunen 1990: 54-55). Here the
device seems to serve no specific purpose and one of the two terms
appears redundant, as it adds no semantic content to the sentence.
Also in the following expressions (taken from shipping contracts) the
meaning of each term is implied by its parallel: *lawful authority,
mutually agreed, solemnly declared*. A degree of redundancy is

further observed in English contract lexis: e.g. *undertakes to employ* (instead of the straightforward verb *employs*) and *undertakes to be employed* (instead of the shorter *accepts employment*). Another case of redundancy is the repetition of a concept through its negated opposite, as in the expression *within and not exceeding two months* (examples from Opitz 1983). Redundancy is demonstrated in a study by Marita Gustafsson, who ends her analysis of a dozen cases saying that:

> In legal English, binomials are 4-5 times more common than in other prose texts, and they are definitely a style marker in law language. Binomial expressions have a long tradition in legal English. Sometimes they are needed for technical accuracy and for the sake of precision and unambiguity, but there are cases where doubling-up serves no specific purpose. (Gustafsson 1984: 123)

Some cases are apparently unaccountable by standard interpretative resources but may be explained in diachronic terms, as in the past terms did not always possess their present-day meaning: words that now appear synonymous could be semantically distinct in earlier centuries. Their combined use could help ensure semantic coverage of the whole target meaning. A possible example of this is the phrase *last will and testament*, which sounds redundant because it violates the principle of conciseness. According to Mellinkoff (1963), the pair is linked to the use of such terms made by English lawyers, who often applied *will* to movables and *testament* to real estate. To avoid partial reference, the expression *last will and testament* appeared whenever both movables and real estate were intended.

In past centuries, lexical doubling featured not only in legal language but also in other types of text, as demonstrated by the tautological title of Caxton's first printed volume *The Dictes and Sayenges of the Philosophers* (1477). This is proof of an inherent feature of the English language, probably stemming from the Anglo-Saxon repetition of words for alliterative purposes. The explanation is supported by Opitz's claim that lexical doubling also functions as an enhancer of perlocutory force:

> In semantic respect such doubling and tripling can be both distinctive and allusive, providing on the one hand an aid to necessary disambiguation, and on the other serving as a rhetorical device aiming at intensity of effect rather than at increased clarity. It is frequently difficult to distinguish between the two,

particularly so if alliteration adds to the prosodic dimension of the syntagm, blurring its denotative implications: <u>o</u>wned and <u>o</u>perated, <u>v</u>essels and <u>v</u>oyage, <u>b</u>y and <u>b</u>etween, <u>s</u>aid and <u>s</u>olemnly declared. Generally it may be said that redundancy aims at an increase in persuasive force; thus it differs in a fundamental way from efforts of discriminating on the basis of detailed enumeration. (Opitz 1983: 164)

Assonance and alliteration are common also in contemporary legal texts, as in these examples from the contract in Appendix 1: *Fictures Furniture and Effects* (1: 21), *alteration in or addition to* (1: 48-49), *destroyed or damaged* (1: 50-51), *nuisance or annoyance* (1: 72), *rights and remedies* (1: 83), etc.

A degree of redundancy may be observed in the expression *to tell the truth, the whole truth, and nothing but the truth,* used in the oath taken by witnesses in court. The formula may sound highly tautological and even misleading, for it may imply the presence of different types of truth: whole or partial. But in oaths this repeated lexeme and its subsequent qualification are a century-old practice inherited from an age when law-makers needed to specify that the whole truth was required, as opposed to Thomas Aquinas's argument that this kind of oath did not compel a witness to tell "the whole truth".

Apart from these historical considerations, legal English clearly retains to this day examples of redundancy. Many legal texts could be redrafted in a more concise form, with no loss of meaning or increased ambiguity. As Mellinkoff (1963: 388) rightly observes, many of the terms employed in the following text could easily be omitted:

(8a) This lease can be modified and changed only by an instrument in writing signed by the landlord and by the tenant.

The verb *modified* can be omitted because synonymous with *changed*. The qualification *in writing* could also be dropped, because the lexeme *signed* already specifies the written status of the term *instrument*. With these amendments, the text would become more concise and transparent:

(8b) This lease can be changed only by an instrument signed by landlord and tenant. (Mellinkoff 1963: 388)

As explained earlier, however, compliance to tradition is stronger in legal discourse than the search for concision. Specialists in the field shun the responsibility of further simplifying the standard language and closely follow the practices codified by centuries of use.

10. Semantic instability

One of the qualities identified by Guilbert (1973) as distinctive of specialized terminology (alongside univocal meaning, mode of designation and referential specificity) is stability of meaning. But this feature does not apply indistinctly. In fact, terms undergo many semantic transformations, which in turn are linked to ongoing disciplinary evolution. Keynes's use of the lexeme *interest* illustrates how the nature of a concept may change repeatedly in a short time even in the writings of a single author.

Therefore the semantic variation of words due to cultural innovation and evolving social usage is not only typical of general language but also of specialized discourse. Indeed, each variation in the meaning of a word does not always entail variation in, or replacement of, its form. Sometimes semantic change is gradual, in line with slow conceptual transformations related to the evolving view of a given item. For example, the term *purchase* (derived from *chase* and associated to the idea of hunting and force, cf. *The Oxford English Dictionary*) denoted in its early stages the acquisition of something through force. Slowly it specialized and came to mean acquisition through one's actions (as opposed to acquisition by inheritance) until, in the 1500s, it took on its modern meaning of acquisition by payment of a sum (cf. Hughes 1988).

Sometimes the transformation process is due to specific actions that enable us to date exactly when the change occurred. This is the case of certain terms concerning ownership rights which, in response to legislative innovations introduced in 1922 and 1925, underwent even radical changes in meaning. For example, the term *freehold* from 1 January 1926 lost its old meaning of 'a grant issued directly by the

sovereign or a high-ranking lord' and came to mean 'ownership rights not originating from a lease' (as opposed to the term *leasehold*, which refers specifically to temporary ownership rights) (cf. Cecioni 1986).

The presence of new meanings which eventually replace existing ones may lead to ambiguity, because the two may overlap in actual use. The ambiguity may become greater when semantic transparency is applied to the original term, since the tight link between a term and the concept originally assigned to it is weakened when the concept's constituent features change in response to evolving disciplinary knowledge. The term *atom*, for example, points to the notion of indivisibility; the term *hypnosis* to the Greek word for sleep. Scientific discoveries have altered the essential nature of these terms, which now fail to reflect their original etymological meaning.

11. The relationship with general language

Semantic evolution very often originates from the specialisation of word meanings in the general language. Williams (1976) observes that such terms as *experiment* and *experience* – largely interchangeable until the 1700s – have since acquired an increasingly precise specification, which now denotes two separate types of knowledge: objective observation based on experimental evidence (*experiment*) and subjective knowledge acquired mainly through the senses (*experience*).

The specialization of words borrowed from everyday language was particularly intense in the 17th and 18th centuries, when rapid technological and scientific development made it necessary to establish a specific lexis for separate disciplines and phenomena. The impact of technology and scientific discoveries was so strong that the secondary meanings added to such terms over the last two centuries have in fact displaced their semantic priorities and now the specialized meaning often prevails over more general interpretations. Examples of this are the terms *industry* and *recession*, whose economic

significance usually prevails over the original notion of 'creative activity' or 'retreat'.

At other times the specialization process has produced new lexemes alongside existing ones which are no longer appropriate. The words *healing*, *treatment* and *therapy*, for example, all refer to the same semantic field of disease treatment but the concept's semantic evolution reflects a parallel change in medical science, whereby the lexeme *healing* was eventually joined by *treatment* and later by *therapy*, in a process of increasing specialization.

For increased referential specialization and terminological contrast with general language, the preferred option is to use Latin or Greek. Thus, for the physical concept of 'speed' the Latin-based *velocity* was chosen, as opposed to the everyday word *speed*; similarly, the Greek-based *gynaecologist* was coined for a specialist in the female reproductive system and its ailments instead of the existing term *midwife*, which was inadequate because it implied a different, less specialized profession.

In his study of English lexical development, Hughes (1988) identifies five generations of borrowings from classical languages. The first phase, dating from the Roman occupation of England, chiefly concerned Latin and its influence. The second phase occurred in the 6th-7th centuries and involved above all religious terminology. A third phase of classical borrowings with literary connotations took place during the Renaissance. In the 17th-18th centuries classical borrowings extended to specialized discourse, as exemplified by the terms *appendix*, *antenna*, *premium*, *carnivorous*, etc. According to Hughes, the classical borrowings of the last two centuries belong to a fifth phase, as they preserve their original inflection and spelling to the point of appearing perfectly 'foreign' to native English speakers. These borrowings are also likely to agglutinate, as observed in the words *otorhinolaryngology*, *chthononosology*, *sphygmomanometer*, etc.

Many classical-rooted terms have produced hybrid prefixes and suffixes that are widely used in specialized languages, e.g. *kilo-*, *auto-*, *mega-*, *micro-*, *mini-*, *multi-*. Within this category, there is a group of items used initially or terminally: Bauer (1983) refers to them as 'combining forms' rather than affixes because, unlike the latter, they

are combinable. Their union produces such compounds as *protogen*, *biocrat*, *graphoscope*, *electrophile*, etc.

The study of lexemes within a given semantic field may therefore provide interesting evidence for our understanding of conceptual evolution. An example of this insight are the names of body parts (in the left-hand column below) and their equivalent adjective:

(9)   brain   cerebral
        chest   thoracic
        heart   cardiac
        liver   hepatic
        rib   costal
        skin   dermal
        lung   pulmonary

An investigation of lexical resources related to body parts shows that the nouns are mostly Anglo-Saxon, whereas the adjectives are generally rooted in classical languages. This reflects the development of knowledge in anatomical science: from the superficial description of outward appearance typical of Old-English writers, to the more scientific approach followed in later centuries and confirmed by the introduction of Latin- and Greek-based words into English lexis.

12. Metaphor in specialized discourse

Another common device used in specialized discourse to create terms drawn from general language is metaphorisation. Metaphor creation is, indeed, a frequent feature not only of everyday language but also of specialist texts, especially for the purpose of catachresis.[6] This process has a number of advantages, all related to the general criteria of specialized lexis mentioned earlier. The first of these is terminological

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6   For a definition of the concept of catachresis cf. Black 1962: 33: "The use of a
        word in some new sense in order to remedy a gap in the vocabulary;
        catachresis is the putting of new senses into old words."

transparency, achieved when a metaphor is used instead of a neologism so that its lexeme exploits the semantic association linking a clearly-codified *signatum* to an existing *signans*: transparency is thus produced by referring new concepts to pre-existing items within the interlocutor's semantic repertoire. Another advantage is the conciseness allowed by metaphorisation, whereby the choice of a given lexeme points immediately to a body of existing information known to the interlocutor, thus favouring rapid information transfer without lengthy conceptual explanations or complex terminological definitions.

The third advantage is the tangible quality of images from the physical world used to represent abstract and often complex concepts that would otherwise be difficult to define. As argued by Kuhn (1962), new theoretical frameworks are established through a process of persuasion that runs parallel to conceptual development. The greater the effectiveness of presentation, the greater the degree of persuasiveness of a new theory. An element that may increase effectiveness is the tangible quality of terminology, which metaphor brings to the fore alongside transparency and conciseness. Such advantages are clearly illustrated by phrases occurring in the field of economics: the *elasticity* of demand, a condition of economic *depression*, an *imbalance* in market trends, *competition* among firms, etc. Many of these are so well established in everyday usage (not only among specialists) that their metaphoric value is hardly perceived – qualifying them for the status of 'dead metaphors'. This has meant a progressive weakening of markedness and a gradual transition into everyday lexis.

Research on metaphor has often stressed the substitutive function of this device, which may serve to replace another term. An example cited by Black is "the chairman plowed through the discussion" (1962: 27), where the verb *plow* violates semantic conventions that link it to the use of a farming implement for digging soil. It belongs to the class of indirect speech acts (Searle 1979), where the meaning understood by our interlocutor does not exactly or literally follow the conventional meaning of the terms actually employed. In specialized discourse, however, metaphors are seldom employed as substitutes and their function is chiefly stylistic. The use of words in a metaphoric context is generally made to highlight the

expressive connotations of a concept, thus increasing its aesthetic value.

Linguists have also defined certain metaphors as 'shortened similes'. They date back to Aristotle's *Rhetoric* and occur whenever the two terms of a metaphor have similar semantic values linked by an equivalence. The device is also found in specialized discourse, as illustrated by Schopenhauer's claim that "a geometrical proof is a mousetrap" (cited in Black 1962: 35). Here a resemblance is established between 'geometrical proof' and 'mousetrap', through joint reference to the notions of 'delusive reward', 'disagreeable surprise', etc. There is clearly no catachresis, as the specialized concept of 'geometrical proof' is not asserted through the 'mousetrap' metaphor. The value of this metaphor is purely stylistic, therefore, and only adds connotation to the specialized term.

The use of metaphor not for catachresis but as an elliptic simile occurs in other areas of specialized discourse, especially when the prevalent aim is to popularise knowledge. See, for example, the claim that "an atom is a tiny solar system", where the analogy provides a tangible interpretative key to such a highly abstract idea as 'atom'. Research on metaphor has also emphasised its interactive function (Black 1962), which arises whenever the second term does not merely qualify the semantic features of the first term but also adds new ones. Thus, for example, in Black's metaphor "man is a wolf" the second term (*wolf*) does not merely transfer to the first term (*man*) the negative qualities (fierceness, aggressiveness, cruelty, etc.) attributed to the lexeme *wolf* by cultural stereotypes, but also adds the qualities of the former to the latter. Black argues that:

> If to call a man a wolf is to put him in a special light, we must not forget that the metaphor makes the wolf seem more human than he otherwise would. (Black 1962: 44)

While other types of metaphor are easy to paraphrase because their referent is clearly identifiable – whether in the concept defined by metaphoric catachresis, in the term of comparison (in metaphoric similes) or in the literal meaning (with metaphoric substitution) – interactive metaphors contain no explicit reference and have to be inferred by the interlocutor. Moreover, paraphrasing interactive

metaphors is a more complex task, as it involves the simultaneous translation of semantic traits shared by both terms. The same types of metaphor are found in specialized discourse, as confirmed by two examples from Boyd (1979): "the brain is a computer" and "information is stored in the memory", where direct association is established between computer science and human functions. For Boyd these metaphors are constitutive of the theories they convey, since behavioural similarities between humans and computers have added new interpretations to the phenomena concerned and new theoretical insights to evolutionary psychology. In this light, they are neither marginal nor secondary but play a fundamental part in disciplinary development by promoting the discovery of new features and properties in the metaphorised items.

Since the pairing of two semantic fields is a very unusual option, however, these metaphors require a greater effort on the interlocutor's part for decoding. They are more creative but may also allow more arbitrary interpretations. This feature has attracted the charge of imprecision and vagueness: figurative language was severely stigmatised especially in the hard sciences during the 17th and 18th centuries, as in the following passage by Locke:

> If we would speak of things as they are, we must allow that all the art of rhetoric, besides order and clearness; all the artificial and figurative application of words eloquence hath invented, are for nothing else but to insinuate wrong ideas, move the passions, and thereby mislead the judgment; and so indeed are perfect cheats: and therefore, however laudable or allowable oratory may render them in harangues and popular addresses, they are certainly, in all discourses that pretend to inform or instruct, wholly to be avoided; and where truth and knowledge are concerned, cannot but be thought a great fault, either of the language or person that makes use of them.
>
> (*Essay Concerning Human Understanding*, Book III, Ch. 10)

Even metaphors that produce catachresis may, out of their original context, lead to instances of ambiguity. Henderson (1982), for example, relates a case of misunderstanding of the metaphor *parent company*, interpreted as meaning 'a firm that has established another firm' rather than 'a firm controlling another firm'. The imprecision of metaphors is therefore inherent in their nature and ambiguous interpretation may occur even when the utmost clarity was intended.

At times, imprecision depends on the immaturity of scholarship in the field, when the semantic content or a new metaphoric term is not yet well established. But this is also the stage when metaphor may contribute significantly (though imprecisely) to the circulation of theoretical innovations that would be impossible to convey through evidence or by more scientific means. As argued by Black:

> We need the metaphors in just the cases when there can be no question as yet of the precision of scientific statement. Metaphoric statement is not a substitute for a formal comparison or any other kind of literal statement, but has its own distinctive capacities and achievements. (Black 1962: 37)

Even the ambiguity of these new metaphors may be beneficial, as it stimulates debate among specialists for improved definition of new theoretical concepts. In this sense, Boyd expresses a favourable view of interactive metaphors also in specialized discourse:

> In particular, their success does not depend on their conveying quite specific respects of similarity or analogy. Indeed, their users are typically unable to precisely specify the relevant respects of similarity or analogy, and the utility of these metaphors in theory change crucially depends upon this open-endedness. (Boyd 1979: 357)

Some specialists widely employ metaphoric processes in theoretical writings, on the assumption that they are specially suited to the textualisation of their argumentative method. By exploiting their evocative power, metaphors allow the establishment of referential links at various levels of language and in different experiential domains.[7] Some scholars even campaign for a greater use of figurative language in specialized discourse. One of these is McCloskey (1985), who is convinced that the textualisation of certain concepts calls for the use of metaphor rather than other more precise devices, because it conveys concepts more directly and may replicate the author's theoretical reasoning in the reader by association with other concepts from the reader's cultural background. Moreover, the interpretation of

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7   This characteristic of metaphors has aptly been pointed out by Mirowski: "The use of metaphor sets up a field of secondary and tertiary resonances, contrasts, and comparisons that do not merely describe, but also reconstruct and transform the original metaphorical material." (Mirowski 1988:136)

textual metaphors may help decode the conceptual system that underlies the author's theoretical stance. As Lakoff and Johnson have clearly emphasised:

> Metaphor is not just a matter of language, that is, of mere words. [...] On the contrary, human thought processes are largely metaphorical. [...] Metaphors as linguistic expressions are possible precisely because there are metaphors in a person's conceptual system. (Lakoff / Johnson 1980: 6)

Lakoff and Johnson's analysis of English shows that the systematic arrangement of different metaphors in specific semantic fields is a consequence of conceptual patterning within the language community. An example of this is their list of metaphors demonstrating how the notion of 'argument' is normally interpreted as 'war':

(10)   Your claims are *indefensible.*
        He *attacked every weak point* in my argument.
        His criticisms were *right on target.*
        I *demolished* his argument.
        I've never *won* an argument with him.
        You disagree? Okay, *shoot!*
        If you use that *strategy*, he'll *wipe you out.*
        He *shot down* all my arguments. (Lakoff / Johnson 1980: 4)

Many other examples are supplied to prove the common conceptual origin of metaphor groupings, e.g. 'time is money', 'language communication is a channel', 'good is up', 'bad is down', etc. A similar interpretation is given by Kornai (1983), who highlights the close conceptual link between economic metaphors and medical terms: in specialized literature, the separate parts of the economy are often compared to parts of the human body, while the system's failures are often seen as ailments and redressive action as a form of therapy.

As a confirmation of the method proposed by Lakoff and Johnson a few metaphors drawn from a text on economics will be examined so as to interpret the conceptional framework underlying the author's approach. The text taken into consideration is Chapter 12 of *The General Theory*, in which Keynes analyses long-term investments. His thesis is based on the assumption that investment decisions do not rely merely on objective factors, but are conditioned

by subjective elements which cannot always be predicted with absolute certainty and which therefore make the whole investment system very unreliable. Indeed, investors' choices are determined by their expectations of possible future earnings, which generally do not depend on objective evaluations but on optimistic or pessimistic views of the future trends on the stock markets. This irrational feature does not characterise only common people, but also professional agents, whose general practice is to buy those stocks and shares whose quotations are expected to rise and sell those whose value is expected to fall. This sort of behaviour is likened to a sort of game by Keynes:

(11) It is, so to speak, a game of Snap, of Old Maid, of Musical Chairs – a pastime in which he is victor who says *Snap* neither too soon nor too late, who passed the Old Maid to his neighbour before the game is over, who secures a chair for himself when the music stops. These games can be played with zest and enjoyment, though all the players know that it is the Old Maid which is circulating, or that when the music stops some of the players will find themselves unseated. (Keynes 1936 / 1973: 155-156)

This interpretation is strengthened by the many metaphors belonging to the semantic field of gambling which appear in the text:

(12) the affair was partly a *lottery* (p. 150)
   a mixed *game* of skill and chance (p. 150)
   a *game* of Snap (p. 155)
   a *pastime* (p. 156)
   these *games* can be played with zest and enjoyment (p. 156)
   professional investment may be likened to those newspaper *competitions* (156)
   large profits to be gained from the other *players* (p. 156)
   unperturbed by the prevailing *pastime* (p. 156)
   predominate in their influence over the *game-players* (p. 156)
   the *game* of professional investment (p. 157)
   the *gambling* instinct (p. 157)
   the higher return from the *pastime* (p. 157)
   a by-product of the activities of a *casino.* (p. 159)

The number of metaphors drawn from the semantic field of gambling is so high that their choice cannot be deemed at all as casual, but is clearly the result of the author's choice to evoke in the reader's mind an immediate association between the concept of investment and the typical aspects connected with the field of gambling: unpredictability,

risk, etc. The long series of references to this semantic area culminates in the indication of 'animal spirits' as the source of inspiration for future investments:

(13)   Most, probably, of our decisions to do something positive, the full consequences of which will be drawn out over many days to come, can only be taken as a result of animal spirits. (Keynes 1936 / 1973: 161)

A confirmation of the usefulness of the analysis of the metaphorical aspects of a text to deduce the author's conceptual system can be found in Hübler's study of articles in economic papers dealing with a crash on the stock market. Hübler identifies three main "metaphoric paradigms". The first corresponds to that of a natural catastrophe:

(14)   like survivors of a natural disaster
        business in the City of London was almost shut down after overnight storms
        to weather the turbulence of the last week
        the deluge of orders
        last week's explosion did not lack for triggers. (Hübler 1990: 384)

Many of these metaphors collocate with elements signifying details related to weather phenomena, often subjected to anthropomorphic metaphorising. Thus unfavourable weather conditions are seen as a dangerous result of aggressive moves. This is confirmed by the many metaphors related to the semantic field of aggression and physical violence present in the articles examined:

(15)   aggressive selling sent share prices broadly lower
        the onslaught of orders
        it was the overseas market which clobbered us this morning
        the crash has dealt a mighty blow to jobbing firms. (Hübler 1990: 385)

It is the nature of aggression to victimise whoever is the target of the attack. This victimisation is reflected by the third metaphoric paradigm, which is expressed in terms of suffering, resisting and escaping:

(16)   insurance shares were battered
        equities in Europe and the US were whiplashed
        high-tech issues were hurt
        bourses took a severe bruising
        computer hardware stocks were savaged

other financials showed some resistence
only Madrid bucked the trend
European bourses struggled to hold on to their ground
the market should find a floor in the current zone
selected second liners regained their poise
Sri Lanka stocks escape storm. (Hübler 1990: 385-386)

Although some of these paradigms may be culture-specific (Hübler 1997, Candlin / Gotti 2004a, Candlin / Gotti 2004b, Bargiela-Chiappini / Gotti 2005), whenever they occur they are strictly connected and placed along a hierarchical scale. As the second paradigm derives from the first, and the third from the second, the leading paradigm is the first one, to which all metaphoric expressions ultimately relate.

13. Lexical productivity

As discussed earlier, specialized discourse employs words drawn from general language, which are incorporated through a process of specialization and metaphorisation.[8] But the opposite has also occurred, especially over the last century: terms coined in a specialized setting are increasingly likely to become part of everyday lexis. A well-known example of this is the word *bank*, often applied to containers for disposal or recycling of human organs, bottles, data: a clear deviation from the original meaning of a place for the storage of money. Several instances of this non-economic use are listed in the *Oxford English Dictionary* and its *Supplement*, the year in brackets being their earliest occurrence: *blood bank* (1938), *nerve bank* (1945), *bone bank* (1947) and *foetal tissue bank* (1959).

The high number of specialized terms now present (often metaphorically) in general use has convinced many linguists that the lexical system of specialized discourse is more productive than that of standard language. The frequent appearance of technical neologisms is

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8   For further exemplifications of neologisms in specialized discourse cf. Chapter
       7 concerning the lexis of computer science.

no proof, however, that specialized languages possess a more powerful system of lexical formation. As shown in this chapter, the process of terminological creation has followed the same rules present in standard language. Specialized discourse does admittedly employ a greater number of morphemes per lexical unit and has a higher lexical concentration, as well as more prefixes and suffixes, borrowings and calques, but all these phenomena are also found in general language. So the constant production of specialized terms is not due to the greater potential inherent in the lexical system of specialized discourse but rather to the rapid evolution of disciplinary fields and the constant redefinition of existing terms and concepts.

III. Syntactic Features of Specialized Discourse

Scholars investigating specialized languages have often argued that these are equipped with unique syntactic patterns which do not occur in general language. Charrow claims that legal discourse follows specific syntactic rules:

> It also differs significantly from normal usage. It is more than a professional jargon, as it contains its own peculiar syntactic constructions. (Charrow 1982: 82)

The syntactic forms mentioned in such studies, however, do not contain any rules not found in general language. This impression is based on the inspection of various studies on the syntactic features of specialized discourse focusing on phenomena that are not unknown also in general language. The most likely conclusion is that the specificity of morphosyntactic phenomena found in specialized languages is not a qualitative but a quantitative one. Certain features may also occur in general language but their higher frequency in specialized discourse makes them typical only of the latter. This chapter targets the main syntactic features displayed by specialized texts. It investigates not only their originality and frequency but also attempts to account for the pragmatic motives that originate them.

1. Omission of phrasal elements

A prominent distinctive feature of specialized discourse is its extremely compact syntactic structure. This is not surprising but indeed confirms the principle of conciseness discussed earlier in relation to the development of specialized lexis (cf. Chapter 2). A very common, straightforward way to make the sentence more

concise is to omit one of its constituents. This does not prevent textual comprehension because the value of any omitted elements may be inferred from the context or reconstructed by reference to knowledge shared by the language community. Omission is especially frequent in specialized texts, although some of the phenomena identified in the literature are related to the channel employed rather than the specificity of a given language. Some authors have mentioned the omission of articles and auxiliaries in faxes and emails for business communication as an example of this aspect of specialized discourse, forgetting that such omissions are not instrumental to the subject matter but rather to the channel of communication, which for external (i.e. financial) reasons requires a reduction to the minimum in the number of words employed.

There are many other cases where omission of phrasal elements in specialized texts is due to the need for conciseness. For example, in the following excerpt from a technical manual, articles are often omitted to make the text more compact (the asterisk shows that an article would normally be present in that position):

(1)   *Rubber plug method of tubeless tire repair*

1. Remove * puncturing object if still in *the* tire. (* Tire is not dismounted from *the* rim.)
2. Fill * tire with air to 30 psi. Dip * probe into * cement, insert it into * injury and work up and down to lubricate * injury.
3. Grasp each end of * patch. Stretch and roll * center of * patch into * eye of * needle. Remove * protective covering from both sides of *the* patch, being careful not to touch * raw rubber.
4. Dip * perma strip into * cement, making sure that all surfaces are coated.
5. Insert * patch slowly and steadily into * injury, up to * handle. Then turn * needle ¼ turn and remove.
6. Without stretching *the* patch, cut it 1/8" from *the* tread.
7. Inflate to * proper pressure. * Tire is now ready for service.
             (Bricker, *Automobile Guide*: 476; quoted in Trimble 1985: 121)

The omission of articles and prepositions is a standard feature of instructions also in Italian manuals, as illustrated by such expressions as *premere pulsante A*, *accusare ricevuta*, *fornire istruzioni in linguaggio macchina*, etc. The omission of the article can also be

found in legal texts, as in *proporre ricorso, presentare istanza, depositare denuncia* (for more examples cf. Rovere 2002).

2. Expressive conciseness

Apart from the simple omission of phrasal elements, there are other linguistic devices which make the sentence denser. An overview of the different cases found in specialized texts clearly indicates, however, that these do not follow rules restricted to specialized languages but normally implement rules found also in general language. As evidence of this claim, a specific case will be discussed below: the linguistic strategies employed in English specialized texts to avoid relative clauses and make the sentence structure 'lighter'. The rules that allow for such devices are not limited to specialized discourse but are found also in general language. Indeed, a first possibility commonly employed in specialized texts is the substitution of relative clauses with adjectives usually obtained by means of affixation. The prefixes and suffixes generally adopted have precise semantic values, which enable the decoder to interpret their communicative function appropriately. Here are a few examples of this use of affixes:

(2)   Workable metal. (= Metal which can be worked.)

(3)   Reactive force. (= Force which reacts.)

(4)   Absorbent material. (= Material which absorbs.)

Another device commonly adopted to simplify a relative clause containing a passive form consists in omitting its subject and auxiliary, as in the following cases:

(5)   Pieces of iron left in the rain become rusty. (= Pieces of iron which are left in the rain become rusty.)

(6)   He devised an instrument called a spectroscope. (= He devised an instrument
       which is called a spectroscope.)

This is particularly frequent when the relative clause refers to a
concept explained previously. In this case the verb of the relative
clause is turned into its past participle form and placed after the noun
it specifies:

(7)   A pilot tube was used to measure the flow through the pipe. The instrument
       used was type 4CA.

The passive construction is also avoided by turning the verb into a
past participle and using the latter as a premodifier:

(8)   Compressed air can be used for several purposes. (= Air which is compressed
       can be used for several purposes.)

If the agent is to be stated, it is placed before the past participle; the
link between the two elements is made explicit by means of a hyphen:

(9)   The car has a water-cooled engine. (= The car has an engine which is cooled
       by water.)

(10)   A computer-calculated result. (= A result which has been calculated by a
       computer.)

These processes obey the criteria of conciseness and transparency.
Indeed, the resulting expressions are shorter than the original ones
containing relative clauses; moreover, they are clear, as the omitted
elements can easily be deduced by the decoder. By exploiting the
shared knowledge concerning the negative value of the prefix *un-*,
negative relative clauses are often omitted and this prefix is added to
the past participle used as a premodifier:

(11)   The unwanted liquid was thrown away. (= The liquid which was not wanted
       was thrown away.)

When the passive form is modified by an adverb, the latter is joined
by means of a hyphen to the past participle of the verb and placed
before the noun:

(12)   An incorrectly-designed bridge may have a short life. (= A bridge which is designed incorrectly may have a short life.)

When the verb of the relative clause is followed by the adverbial phrase *in this way*, this expression is substituted by *thus* or *so*, which is placed before the past participle of the verb:

(13)   The results thus / so obtained were inaccurate. (= The results which were obtained in this way were inaccurate.)

Thus and *so* are not only used to avoid a relative clause, but also to avoid awkward coordinated clauses joined by the expression *and in this way*. The use of one of the above-mentioned adverbs followed by a gerund form confers greater conciseness to the sentence, as can be seen in the following example:

(14)   When the piston is drawn sharply upwards, the air below the piston rises, thus causing the pressure to fall. (= When the piston is drawn sharply upwards, the air below the piston rises, and in this way it causes the pressure to fall.)

Another adverb commonly used in English to avoid a relative pronoun is *whereby*. The greater degree of conciseness provided by this adverb compared to the more extended adverbial phrase *by means of which* can easily be perceived in the following example:

(15)   Cracking is the process whereby kerosene is extracted. (= Cracking is the process by means of which kerosene is extracted.)

Another strategy to reduce the complexity of a sentence consists in the transformation of the verb of a relative clause into a present participle. Here is an example:

(16)   Tungsten is a metal retaining hardness at red-heat. (= Tungsten is a metal which retains hardness at red-heat.)

This strategy is often adopted also in Italian specialized texts[1] as the following examples show:

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1   In Italian the use of the present participle offers great advantages also when coining new terms. Cf., for example, the present participle *tangente*, initially

(17)   Una traiettoria pendente su un asse perpendicolare. (= una traiettoria che pende su un asse perpendicolare.)

(18)   Un mobile cadente da un piano superiore. (= un mobile che cade da un piano superiore.)

The present participle is often used as an adjective. This construction is also possible in the general language, but is much more frequent in specialized discourse. Here is an example:

(19)   A robot controls the moving line. (= A robot controls the line which is moving.)

If the verb of the relative clause is accompanied by an adverb, the latter is placed before the present participle:

(20)   They have selected a fast-growing plant. (= They have selected a plant which grows fast.)

This construction is also used when the verb of the relative clause is followed by an object. In the transformation, the latter is placed before the presente participle:

(21)   Malaysia is a rubber-producing country. (= Malaysia is a country which produces rubber.)

(22)   A ruler is a length-measuring instrument. (= A ruler is an instrument which measures length.)

In many cases this simplification process proceeds further, with the disappearance not only of the subject of the secondary clause and its auxiliary, but also of the verb itself, whose meaning thus becomes implicit:

(23)   A pentagon is a figure which has five sides. > A pentagon is a figure with five sides. > A pentagon is a five-sided figure.

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used with a verbal function *(una retta tangente un arco)*; later it was used with an adjectival function *(la retta tangente l'arco)* often employed in an elliptical form *(la tangente l'arco)*; in the end the present participle form is used as a noun *(disegnare la tangente di un arco)*.

In some cases this process implies several instances of simplification, and the result may be a noun specified by another noun. A few examples of the various processes of simplification adopted may illustrate this point:

(24)   A train which carries passengers.
        A train for carrying passengers.
        A passenger-carrying train.
        A passenger train.

(25)   An engine which is driven by diesel oil.
        An engine driven by diesel oil.
        A diesel (oil)-driven engine.
        A diesel engine.

As these elliptical forms offer a higher degree of compactness, they are widely adopted in specialized texts, where the criterion of expressive conciseness is greatly appreciated.

3. Premodification

The phenomenon of relative clause reduction shows a frequent switch from postmodification to premodification. This transition is particularly straightforward in English because its syntactic rules allow several adjectival uses of phrasal elements. While Italian relies on left-to-right construction, English can easily employ right-to-left construction, which shortens sentences and makes the noun phrase especially dense. A distinctive aspect of the right-to-left pattern is nominal adjectivation, i.e. the use of a noun to specify another with an adjectival function. This type of specification can cover such features as the material of which an item is made (e.g. *ferrite core*, *paper tape*, *silicon chip*), its use (e.g. *access arm*, *load program*), its function (e.g. *control byte*), and others. Very often, compounds consisting of two short nouns soon merge into a single term after a certain period of use; at first the two nouns are hyphenated and subsequently they become one word (e.g. *flowchart*, *plugboard*, *sumcheck*). Although not an

exclusive option of specialized languages, this feature occurs more frequently and generally produces longer compounds in specific fields, as illustrated also by the following data in a study by Salager (1984: 139) – cf. Table 1:

	Average length of compounds	*Percentage of compounds in text*
TECHNICAL ENGLISH	2.61	15.37
MEDICAL ENGLISH	2.55	9.76
GENERAL ENGLISH	2.51	0.87

Table 1. Average length and frequency of compounds in various types of texts.

Specialists show a preference for nominal adjectivation, which not only makes exposition denser but also attaches great semantic weight to the compound. This is shown also by the frequent use of attributive nouns rather than adjectives. Hughes (1988) points out that in scientific English such compounds as *gravity anomaly* and *energy-rich molecules* are favoured over the equivalent forms with an adjective functioning as attribute. Data on the high frequency of nominal adjectivation in medical and scientific discourse confirm Herzog's (1971) early analysis of computer language, which yielded the following figures for the occurrence of compounds comprising various items:

- 2 items: 10%
- 3 items: 36%
- 4 items: 40%
- 5 items: 12%
- 6 items: 2%.

The maximum number of items is generally six, due to the human mind's limited capacity for short-term memorisation (cf. Miller 1967), which seldom exceeds sequences of seven elements. Moreover, the decoding of long nominal groups poses a major interpretative challenge for the addressee, who is forced to identify the semantic-syntactic links between different groups, subdividing them as suggested below:

(26)   (((Block fill-in) (data control)) process).

Of course, this kind of division is possible if the addressee draws not only on his awareness of syntactic rules but also on his knowledge of the semantic value of each word within the compound – a knowledge associated with his specialised training. There are indeed various cases in which noun compounds may be interpreted in different ways. To solve ambiguities of this type, linguistic competence alone is not sufficient and has to be integrated by specialist knowledge of the topic and of other factors such as context and co-text. For instance, the noun phrase *a small car factory* allows two interpretations:

(27a)   A small factory for making cars.

(28a)   A factory for making small cars.[2]

The hyphen is employed as a disambiguator to avoid multiple interpretations and it signals semantic links between words. For example:

(27b)   A small car-factory. (= A small factory for making cars.)

(28b)   A small-car factory. (= A factory for making small cars.)

At times ambiguity is caused by a polysemous premodifier. In the compound *silver lead ore*, for instance, the noun *silver* refers to a mineral and the whole phrase denotes a mineral compound of silver and lead; while in *silver copper*, the word *silver* refers to its colour and the whole group denotes not a metal combination of silver and copper but the silvery colour of a special type of copper. Similarly, the compound *building supervisor* is interpretable in two ways because of the dual nature of the term *building*, i.e. a construction but also the action of erecting it.

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2   Another example of ambiguity can be seen in the following sentence: "Water enters the bottom of the heating flask." As aptly pointed out by Swales (1971: 140), this sentence may suggest two interpretations: "Water enters the bottom of the flask which is getting hotter / Water enters the bottom of the flask which is used for heating."

Adjectivation often takes on complex syntactic values because it originates from the evolution of noun groups but also of phrases containing other items such as adjectives and past participles. In this case, premodification is of a hybrid nature:

(29)   An L-shaped computer room. (= A room for computers which has the shape of an L.)

The following noun phrase contains a premodifying present participle, which is premodified by an adverb:

(30)   The steadily diminishing transverse velocity component. (= The transverse component of velocity which diminishes steadily.)

Therefore the use of premodification offers advantages in terms of greater textual conciseness, offset, however, by a loss of conceptual clarity. This can be shown by comparing the following sentences: although the former is more compact, the latter is much easier to decode:

(31)   A two-pole rotating coil a-c generator. (= A generator of current which alternates, which has two poles and a coil which rotates.)

The previous chapter stressed the importance of precision and interpretative clarity in specialized discourse. Why, then, is premodification so common in such texts, despite its potential for ambiguity? First of all, one must say that ambiguity is often apparent rather than real, because specialist knowledge helps the addressee to rule out inappropriate meanings in the decoding process. What is more, the transition from postmodification (typical of elementary utterances) to premodification allows the construction of more complex sentences. In the following case, for example, the avoidance of the relative clause used in the first sentence allows the final compound to be used as subject, object or indirect object of another sentence.

(32)   The rate at which inflation grows.
        The rate of inflation growth.
        The inflation growth rate.

The new sentence including this noun compound becomes conceptually richer and syntactically shorter and more compact. First through the device of relative clause omission (leading to verbal nominalization) and later through nominal adjectivation there is a transition from a subordinate clause (with its impact on logical linearity) to a nominal compound, which functions more easily as subject, object or indirect object in subsequent sentences. Another advantage of premodification is its potential for concept formation. The combination of two or more terms produces not only a mere union of existing concepts but the premodification process often gives rise to a new concept that alters their nature, adding new meaning and uses. In this light, the semantic value attached to each element of the compound loses its identity to produce a new entity, which in turn becomes a conceptual referent and a starting point for the emergence of new compounds.

4. Nominalization

Another very common syntactic phenomenon of specialized discourse (not only in English but also in Italian and other languages) is nominalization. This involves the use of a noun instead of a verb to convey concepts relating to actions or processes, a use commonly referred to with the term 'grammatical metaphor' within Systemic Functional Linguistics (cf. Halliday 1994). Specialized discourse makes frequent use of nominalization because verb-derived nouns seem to reflect the parallel process whereby results are inferred from experiments and objects from their construction process (cf. Halliday / Martin 1993). The preference for nominalized forms leads to higher nominal density in specialized texts – far greater than that found in texts of a general nature. Sager *et al.* (1980), for example, found that nouns account for 28% of words in general texts and 44% in specialized texts. If the number of adjectives is also considered, the two cover 60% of words.

Naturally nominalization is not unique to specialized discourse, as it also occurs in general language. What makes it distinctive is its frequent use by specialists and the high level of pre/postmodification involved. In the following example, nominalization of the verb *observe* into the noun *observation* allows use of the syntactic compression devices mentioned earlier, namely nominal adjectivation and premodification:

(33)   A day and night weather observation station. (= A station in which people
       observe the weather both by day and by night.)

Increasing reliance on nominalization cannot be explained only as a search for greater conciseness, though it is an important reason for transformations of this type. In certain cases there is a clear preference for nominalization even when a verb allows for fewer lexical items. An example of this is the following case cited by Herbert (1965), where the form *by applying* is shorter than its nominalized equivalent *by the application of*:

(34)   The filament is heated by the application of a voltage. (= The filament is
       heated by applying a voltage.)

Several other examples can be quoted from the legal texts included in Appendix 1 to this volume:

(35)   the provisions for the recovery of possession (= the provisions for recovering
       possession) (1: 32-33)

(36)   the amount of all charges made for the use of the telephone (= the amount of
       all charges made for using the telephone) (1: 44-45)

(37)   anything which may be or become a nuisance or annoyance to the Landlord or
       the Tenants (= anything which may annoy the Landlord or the Tenants) (1: 71-
       72)

(38)   except charges for the supply of gas (= except charges for supplying gas) (1:
       86-87)

The same consideration may be made with regard to the number of phrasal items resulting from other instances of substitution, with nominalized forms taking the place of verbs. An example of this is the

substitution of progressive forms expressing ongoing action: here the noun is usually preceded by such expressions as *in the course of, in the process of, in the making of,* etc. Other reasons need to be found, therefore, to account for the pervasive use of nominalization. An overview of this phenomenon in different specialized text types points to other motives linked to textual construction. By favouring the reintroduction of concepts in thematic position, nominalization also allows an easier flow of information from new to given, thus facilitating text development. By thematizing information through nominalization, text also acquires far greater cohesion, as illustrated below:

(39)   It is essential to keep magnetic disks in fireproof safes. This protection of original software, however, is not sufficient. An additional security precaution consists in storing copies at different sites, away from the computer.

In the second sentence, the noun *protection* reintroduces and expands the rhematic part of the first sentence; similarly, the noun phrase *an additional security precaution* at the beginning of the third sentence cohesively reintroduces the content of the first two sentences dealing with *security precaution*. Nominalization allows the writer to emphasise verbal action through thematization. In the following example, the verb *discharge* is placed in thematic position by means of the noun *discharge*:

(40)   Discharge of the contents of the tank is effected by a pump. (= The contents of the tank are discharged by a pump.)

Commenting on the nominalization process observed in Darwin's *Origin of Species*, Halliday (1990) identified a further motive for the use of this syntactic device, namely the opportunity to confer greater objectivity to the author's views:

The effect is one of a massive and powerful life-engendering process – which is however presented synoptically as an objectified 'state of affairs', since words representing processes are in fact nominalized: *production, extinction, succession, (no) cataclysm, selection.* This [...] is a feature of the grammar of the most highly favoured clause type in scientific writing: the nominalization picks up the preceding argument and presents it in this 'objectified' form as something now to be taken for granted. (Halliday 1990: 74)

In dealing with legal discourse, Bhatia (1994) has found another function of nominalization:

> The use of […] nominalised expressions helps the writer to bring in a greater degree of precision and all-inclusiveness in his legislative statements. Nominalisation certainly helps a legal draftsman to make his provisions more compact and yet precise and all-inclusive. (Bhatia 1994: 142)

The pervasiveness of nominalization leads to a loss of verbal value. As a result the verb is weakened and often functions merely as copula, a link between increasingly complex noun phrases. In this case, the preferred verb is clearly *to be*. Huddleston (1971) found as many as 3,926 forms of the verb *to be* in his corpus, as compared to 3,665 occurrences of other active verbs. In another corpus Barber (1985) found that *to be* accounted for 45% of all verbs in the present tense. The verb *to be* is often used as linkage between nominal or adjectival phrases, which in turn derive from syntactic transformation of verbs with a strong semantic content. In the following sentences, for instance, non-copulative verbs are replaced by adjectival forms which are then joined to their corresponding noun phrases by a copulative verb:

(41)   Oscillations are frequency-dependent. (= Oscillations depend on frequency.)

(42)   The tyre is non-skid. (= The tyre does not skid.)

(43)   Danger is practically non-existent. (= Danger does not practically exist.)

Gerbert (1970) suggests an analogy between this type of structure and mathematical equations, in that subject and complement may be seen as two halves of an equation, with the copula functioning as the = sign. Like an equation, the two parts of the sentence joined by the copula are interchangeable: indeed, specialized discourse often exhibits instances of inversion within the sentence, with the subject complement placed in initial position:

(44)   Typical is the case of carbon monoxide.

(45)   More important is the solution of any priority problems that may arise.

This inversion of sentential items is extremely useful, especially when the subject is far longer than the complement. By placing the shorter phrase at the beginning of a sentence the decoder's short-term memory is not forced to wait too long for the complement to disambiguate the meaning of the whole sentence. At times the loss of verbal value is so marked that the verb is omitted altogether. An example of this is found in the following dialogue from Altieri Biagi (1974):

(46)   DIRETTORE: [...] Mi vuol dire qualcosa anche dell'esame obiettivo?
        AIUTO: Paziente semiseduto, leggermente cianotico, discretamente dispnoico [...]
        DIRETTORE: La pressione?
        AIUTO: 150/85, polso ritmico, con extrasistoli sporadiche. Itto non palpabile. Non fremiti.
        DIRETTORE: E all'ascoltazione?
        AIUTO: Il aortico metallico; Il tono polmonare piuttosto forte. Nessun rumore di soffio, ma presenza di IV tono alla punta.
        DIRETTORE: E il torace?
        AIUTO: Nessuna espansione inspiratoria a sinistra: anzi rientranza degli spazi intercostali. Alla percussione, ottusità massiva di tutto l'emitorace sinistro: scomparsa del fremito e silenzio respiratorio. (Altieri Biagi 1974: 75)

In this description of a patient's condition, there is no verb but merely a series of noun groups. The verb may be easily inferred, however, because its function is only copulative. Use of elliptic sentences like this one does not deplete the text's communicative force but makes its content denser and more concise, adding a quality that is highly prized among specialists in the field.

5. Lexical density

In specialized discourse one consequence of frequent nominalization and other premodifying devices is increased lexical density, i.e. a high percentage of content words within a text. Lexical density is especially high in written texts, where – as observed in general language by Chafe (1982) and Chafe / Danielewicz (1987) – discourse

is planned more carefully, without hesitation markers and with less redundancy. A more natural style, closer to spoken language, would make concepts more explicit and require more noun phrases for paraphrase, thus making the text less compact. This is confirmed by the following adaptation (Text B) of an article (Text A) from *Scientific American* suggested by Halliday (1987: 61):

(47)   TEXT A

> Private civil actions at law have a special significance in that they provide an outlet for efforts by independent citizens. Such actions offer a means whereby initiatives of private citizens, individually or in groups, can be brought to bear on technology assessment, the internalization of costs and environmental protection. They constitute a channel through which the diverse interests, outlooks and moods of the general public can be given expression. The current popular concern over the environment has stimulated private civil actions of two main types.

(48)   TEXT B

> One thing is especially significant, and that is that people should be able to bring private civil actions at law, because by doing this independent citizens can become involved. By bringing those actions whether they are acting as individuals or in groups, private citizens can keep on taking the initiative; they can help to assess technology, they can help to internalize costs, and they can help to protect the environment. The general public, who want all kinds of different things, and who think and feel in all kinds of different ways, can express all these wants and thoughts and feelings by bringing civil actions at law. At present, people are concerned about the environment; so they have been bringing quite a few private civil actions, which have been mainly of two kinds.

A comparison of the two texts clearly indicates that although textual items have increased by almost 52% (from 87 to 132 words) and the number of sentences has risen from 5 to 17, content words are virtually unchanged, with only three extra items (from 48 to 51). This means considerably less lexical density, down from 1:1.8 (i.e. about one content word every two tokens) in Text A to 1:2.6 (about one content word every three tokens) in Text B. Text A is therefore specialized because it is more concise and lexically denser than Text B, though both convey the same amount of information.

6. Sentence complexity

As mentioned earlier, one effect of nominalization is the simplification of syntactic structures within the sentence. By switching from verbal to nominal forms, specialists tend to simplify the surface structure of sentences, which are minimized into simple patterns of the type NOUN PHRASE + VERB + NOUN PHRASE. Noun phrases are usually very complex, involving lengthy pre- and post-modification, while the verb phrase often consists of a copulative verb like *be*, *become*, *form*, *mean*, *require*, *depend*, *consist of*. An example in this class is the following:

(49)   The complete development of the fracture model requires an understanding of the bond-rupture reaction.

Evidence like this suggests that specialized languages are simpler in terms of linearity because conceptual complexity is expressed by syntactic and semantic relations within noun phrases. Textual comprehension is easier, therefore, thanks to simplified surface structure but the lexical density of the sentence and the complex patterning of the noun phrases makes interpretation more demanding. Even if surface structure seems elementary from a syntactic viewpoint, such sentences generally derive from various transformations of more complex syntactic structures. In the following case, for instance, the verbal noun derives from a simplified hypothetical clause.

(50)   The testing of machines by this method entails some loss of power. (= If machines are tested by this method, there will be some loss of power.)

This example, like many others offered above as an illustration of relative clause reduction, highlights the tendency of English specialized discourse to avoid subordination. The reliance on coordination is confirmed by different studies. In Butler's (1975) specialized corpus, for example, subordinate clauses account for only 25% of clauses, while all others (three quarters of clauses in his corpus) are main clauses. This confirms Barber's (1985) finding that

main clauses prevail over subordinates; indeed, out of 349 analysed sentences, 250 (71%) consisted only of a main clause. Moreover, 190 (54%) sentences had no explicit subordinate clauses, while 136 others contained one or two explicit subordinates. Only 23 (6.9%) corpus sentences contained more than two explicit subordinate clauses. The low proportion of explicit subordinates does not indicate, however, that specialized texts are simple. Instead, their sentences usually exhibit a high number of non-finite forms, as in the following:

(51)   To explain this remarkable behaviour, each electron is considered to possess an electric charge, the charge being a numerical measure of the force of repulsion experienced between two electrons. (= To explain this remarkable behaviour, each electron is considered to possess an electric charge, which is a numerical measure of the force of repulsion that is experienced between two electrons.)

One may speculate that although the first clause has a more linear structure, its greater implicitness complicates comprehension as it forces the receiver to understand the deep structure underlying each implicit subordinate clause. Yet the use of these non-finite verb forms does not generally involve distinctive syntactic rules but only those applicable to general language. Some of the examples below may help to illustrate this claim. For instance, the following non-finite subordinate is employed to avoid coordination and another main clause:

(52)   The starter motor is switched off, the engine accelerating under its own power. (= The starter motor is switched off, and the engine accelerates under its own power.)

Also in the following example we have the elimination of subordination; to introduce the result or consequence of the action mentioned in the main clause, the secondary clause containing the non-finite verbal form is preceded by the adverb *thereby*:

(53)   The rivet contracts as it cools, thereby drawing the plates together. (= The rivet contracts as it cools, and draws the plates together.)

Instead, in the following case the non-finite form is used to avoid a secondary clause beginning with *since* or *as*:

(54)   The proton is the opposite of the electron, being a particle of positive
         electricity. (= The proton is the opposite of the electron, since it is a particle of
         positive electricity.)

7. Sentence length

Another factor which complicates the comprehension of specialized
discourse is sentence length. Written specialized texts are encoded by
far longer sentences than those found in general language. For
example, in the scientific writing analysed by Barber (1985) average
sentence length is 27.6 words. The phenomenon is even more striking
when it concerns legal texts: in Gustafsson's (1975) corpus of English
legal texts, average sentence length is around 55 words, twice as long
as scientific texts and eight times longer than oral texts. Hiltunen
(2001) has found similarly high figures in his legal corpus, with an
average of 45 words.[3] The considerable sentence length of legal texts
is due to the high number of items required to minimise ambiguity and
misunderstandings. Each mention is supported by specifications that
clarify its identity. An example of this is the noun phrase functioning
as subject of the first clause of the text in Appendix 2 at the end of this
volume. The phrase *This Agreement* is specified by 42 other words
providing further information about its validity, the names of the
parties involved, their legal address, the names assigned to them later
in the contract and mention of the successors to the two signatories:

(55)   This Agreement, effective as of the first day of April, 2003 between Dale
         Johnson Ryder Warren, an Association organized and existing under the laws
         of Switzerland ('Grantor'), its successors and assigns, and DJRW Johnson
         Ryder Simpson & C., its successors and assigns ('Member Firm')

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3   There seems to be, however, a growing awarenes of the importance of
         simplifying the language of legal documents; Kurzon's (1997: 131-132)
         analysis has pointed out average length decreases in British statutes from
         92.50 words in 1970, to 45.06 words in 1980, down to 37.06 words in 1990.

The contract itself appears to consist of only two sentences. The first is organised into word groups clearly separated by spaces: the first group (lines 2-7) refers to the subject of the sentence and is followed by a second group based on the verb *witnesseth* (line 8); the third covers the premises of the contract (lines 9-57), followed by specification of its terms (lines 58-253). The second sentence (lines 254-256) refers instead to the signing of the agreement. As signalled by the schematic structure of the first sentence, this text does not follow the standard word order of English sentences, which generally place the premises before the subject rather than between the verb and the rest of the sentence. However, as shown by Crystal and Davy (1969), this deviation from the ordinary word order is not an isolated occurrence, but seems to typify English legal writing. A few examples from the texts printed in the Appendix may help to illustrate this phenomenon. The most frequent case is the introduction of adverbial phrases or prepositional phrases of time, place and agent into a position that deviates from the norm:

(56)   'The Landlord' includes the persons for the time being entitled in reversion expectant on the tenancy (1: 35-36)

(57)   Leave the Furniture and Effects at the end of the tenancy in the rooms or places in which they were at the beginning of the tenancy (1: 57-58)

(58)   Permit the Landlord or the Landlord's agents at reasonable hours in the daytime to enter the Property to view the state and condition thereof (1: 63-64)

(59)   Not carry on on the Property any profession trade or business (1: 67)

(60)   Permit the Landlord or the Landlord's agents at reasonable hours in the daytime within the last twenty-eight days of the tenancy to enter and view the Property with prospective tenants (1: 75-77)

(61)   subject to prior approval by the Executive Committee of Grantor (as defined in the DJRW Statutes) of the terms and conditions of the Sublicense Agreement and of the acceptability of the Sublicensee. (2: 71-74)

Expressions of time, place and agent are clearly moved forward from their usual slot in the sentence, which breaks the tight syntactic links between noun phrases and their postmodifiers or between verbs and their direct object, thus altering the standard sequence of place and

time phrases normally followed in English. At times, deviations in word order even effect the verb phrase; in the following example the modal auxiliary and its verb are separated by a group of phrasal items:[4]

(62)   This Agreement and all rights and duties hereunder are personal to the Member Firm and shall not, without the written consent of Grantor, be assigned, mortgaged or otherwise encumbered by the Member Firm or by operation of law. (2: 229-233)

Such deviations from the standard pattern may be accounted for by the pervasive need for precision in legal language. Indeed, any mention of people, place or time occurring earlier in the sentence than normally expected is justified by the need to identify the referent beyond any reasonable doubt or ambiguity. On the other hand, when specification occurs immediately after a verb, the prepositional phrase is anticipated to prevent attributing time or place to the direct object. For this reason, the indirect object is placed before the direct object:

(63)   The Member Firm has paid to Grantor the sum of S.fr. 1 (2: 80)

Stylistic considerations may also account for the switch between direct and indirect object, because the direct object is at times long and complex while the indirect object is very short and linear, so that expression and comprehension are improved by inversion. The same reason may be invoked to account for the following cases:

(64)   To return to the Tenant any rent payable for any period while the Property is rendered uninhabitable by fire (1: 93-94)

(65)   Upon the terms and conditions hereinafter set forth, Grantor hereby grants to the Member Firm, and such Member Firm hereby accepts, the exclusive right, license and privilege to use the Service Marks in connection with its providing and advertising of services in the field of management consulting and other related areas and on products related to such services. (2: 62-68)

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4   A confirmation of our data can be found in Gustafsson (1975), who has found 40 examples of phrases placed between the auxiliary and the verb in contexts not commonly allowed by the syntactic rules of standard English.

(66)   the Member Firm shall assign to any successor firm chosen by Grantor ('Successor Firm') all common law rights in and all registrations for the Service Marks or any names or marks likely to cause confusion therewith, and all goodwill associated therewith. (2: 160-165)

The puzzling point in these samples is not that the indirect object precedes the direct object – an acceptable option in English – but rather that the preposition *to* has not been omitted. Even this violation of syntactic rules, however, may be accounted for by the need for clarity mentioned above. Omission of the preposition may in fact undermine clear reference to the action's recipient conveyed by the preposition, thus allowing potential confusion between this item (which, without the preposition, resembles on the surface a direct object) and the existing direct object of the clause. The cases discussed here reveal a further feature of specialized discourse, namely that wherever special needs due to the specificity of the subject matter produce inconsistencies or conflict with the general rules of language, the specialist prefers to alter such linguistic rules for pragmatic purposes. In the case of legal language, the specialist's need for clarity prevails over the syntactic conventions of general language.

A comparison of the two texts in the Appendix highlights another feature of specialized discourse, i.e. the prevalence of pragmatic considerations in a given specialized field over the conventions of general language and other specialized languages. The first part of this chapter stressed how often authors employ syntactic devices that limit the complexity of sentences, particularly through premodification and omission of relative clauses using present participles, past participles and other options. The two texts in the Appendix, on the other hand, exhibit a high number of postmodifiers and relative clauses. This phenomenon may be explained by the same reason given earlier, i.e. the need for maximum clarity typical of legal language – a need which contrasts with the high potential for ambiguity found in nominal attributes and other premodifiers seen at the beginning of this chapter. An example of this is the expression *Every person disposing of*, which allows two interpretations: *Every person who disposes of* and *Every person who has disposed of*. The widespread use of postmodifiers results in longer noun phrases, exemplified by the following expressions from the Appendix:

(67)   the provisions for the recovery of possession by the Landlord in section 21 thereof (1: 32-33)

(68)   without the previous consent in writing of the Landord (1: 65-66)

(69)   except charges for the supply of gas or electric light and power or the use of any telephone (1: 86-88)

Increased length often implies more complex relations between a noun and its postmodifiers. Such complexity is evident, for example, in the syntactic links within the noun phrase that serves as subject in the first sentence of the second texts in the Appendix (2: 2-6):
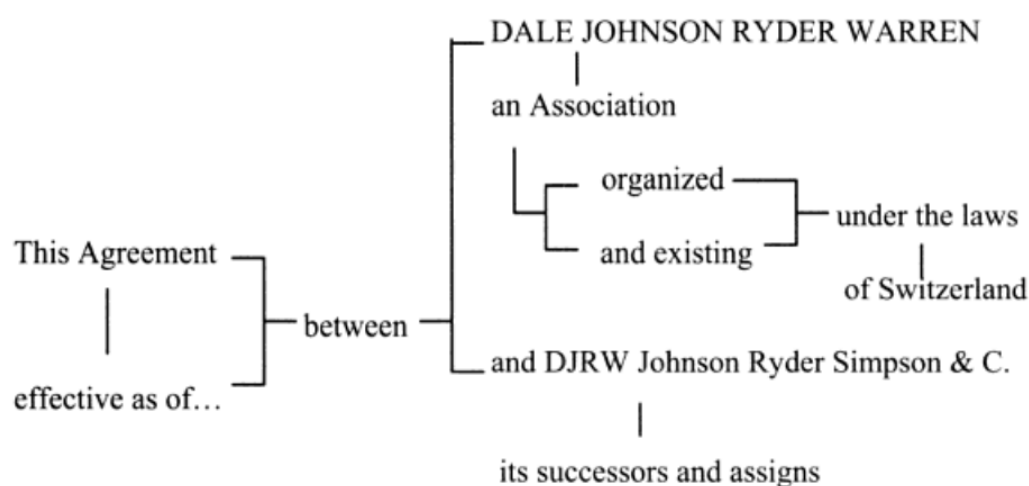
Similarly, the rare elimination of relative clauses leads as a consequence to very long and syntactically complex sentences of this kind:

(70)   The Tenant will [...] pay for all gas and electric light and power which shall be consumed or supplied on or to the Property during the tenancy and the amount of the water rate charged in respect of the Property during the tenancy and the amount of all charges made for the use of the telephone on the Property during the tenancy or a proper proportion of the rental or other recurring charges to be assessed according to the duration of the tenancy (1: 40-47)

At this point, it is easy to explain the considerable length of sentences in English legal writing – generally twice that of other specialized languages. It is due to the rare occurrence of devices that condense the surface length of a sentence, such as nominal attributes, pre-

modification, main clauses reduced to subordinates, omission of relative clauses, frequent use of non-finite rather than finite verbs, etc. If alongside such syntactic phenomena one also considers the cases of lexical redundancy discussed in the previous chapter, evidence clearly points to the greater length and complexity of sentences in English legal discourse. The frequency of finite verb forms and relative clauses creates a highly fragmented sentence structure, broken by embedded sentences which in turn produce further subordinate clauses. The resulting structure operates therefore at various levels and is more complex than in other specialized languages. This is confirmed also by Hiltunen's (1984) finding that the average depth of embedded sentences is 3.09, far higher than that reported in Ellegard's (1978) analysis of four text genres from the Brown Corpus: 1.85 in popularisations, 2.15 in newspaper articles, 2.05 in literary criticism, and 1.95 in scientific writing. Considerable discrepancy between the figure for legal texts and the second set of results leads Hiltunen to argue that this feature is typical of English legal texts. For the Finnish scholar:

> It thus seems justified to conclude that legal English is distinguished from the genres studied by Ellegard by approximately one degree of subordination. In practice this implies a considerable difference. [...] A comparison with other relevant research indicated that legal English may, with good reason, be considered a sublanguage of its own in this respect. (Hiltunen 1984: 119-120)

8. Use of verb tenses

Various linguists have emphasised the different use of verb tenses in specialized discourse as compared to general language. Among others, Barber (1985: 8) found a prevalence of the following ten tenses in his corpus of English scientific texts:

1. Present Simple Active (64%)
2. Present Simple Passive (25%)
3. Future Simple Active (3.7%)

4. Present Perfect Passive (1.7%)
5. Present Perfect Active (1.4%)
6. Past Simple Active (1.2%)
7. Past Simple Passive (1.2%)
8. Future Simple Passive (0.7%)
9. Present Progressive Active (0.6%)
10. Imperative (0.3%)

In the great majority of cases (89%) the present indicative tense is considered a feature of specialized languages, since the percentage of its occurrences is far higher than that found in common texts. At the same time, as Barber himself admits, there is a strong correlation between these results and the type of text considered. Barber's corpus only contains expository scientific texts, whose prevalent pragmatic functions are definition, description, observation, illustrating qualities and features, stating general truths, postulating scientific laws, explaining standard procedures, etc. All these functions require the present indicative tense, as observed in the following:

(71)   A lathe is a machine which turns a piece of wood or metal round and round against a tool that gives it shape.
       Technology deals with scientific and industrial methods and their practical use in industry.
       Searching consists in finding an item in a table.
       Objects do not float unless their density is smaller than that of water.
       If iron is left in the rain, it becomes rusty.
       A beaker of water is taken and heated over a burner.
       When the search key is found, it delivers the value with which it is associated.
       Systems analysts act as a link between the computer department and the other departments of the company.

The present indicative is not associated to the specificity of the topic but rather to the text's special communicative purpose, which requires a given tense even with non-specialist subject matter. If the texts considered were taken from English technical handbooks – where the main function is to provide instructions for the use of a tool or procedure – there would certainly be a prevalence of the imperative form. Accordingly, analysis of a laboratory report would reveal a

prevalence of the past indicative tense.[5] Indeed, a similar analysis carried out by Dressen and Swales (2000) on a corpus of geological articles, has shown frequent usage of past tenses in texts dealing with rock and formation emplacement and with previous studies on the subject (cf. Table 2).

Rhetorical categories	Description	Emplacement	Commen-tary	Previous studies	Present work	Metadis-course
347 verbs	252 (73%)	30 (9%)	26 (7%)	26 (7%)	7 (2%)	6 (2%)
Present	97%	–	81%	12%	42%	83%
Past	1%	93%	4%	42%	29%	–
Perfect	2%	7%	5%	46%	29%	–
Future	–	–	–	–	–	17%

Table 2. Tense choice correspondences with rhetorical category in the English texts of the corpus analysed. (From Dressen / Swales 2000: 64)

Generally speaking, the present indicative may be said to prevail in specialized texts (although less often than found by Barber). This, however, is not a result of a deliberate choice on the specialist's part but depends on the fact that most of the common communicative functions found in specialized discourse usually call for the use of this tense. When the text is very complex and involves several communicative functions – e.g. argumentative texts on a specialized topic – verb tenses and auxiliaries are found more widely and approximate their use in general language. Because of the limited significance of quantitative analysis, various scholars have taken a different approach to verb tense, turning from statistical data on verb frequency to an in-depth analysis of specific uses. For example, Lackstom, Selinker and Trimble (1970, 1973) tried to account for the special use of past tense, present perfect and simple present forms in specialized texts. They found that the use of these verb tenses varies according to the degree of generality attributed by authors to the phenomena considered. Their analysis concludes that when generality is high, the choice falls on the simple present, while it falls on the present perfect when generality is low; if an event only occurred once,

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5   This consideration leads to the conclusion that, in order to be reliable, corpora should take into consideration a high number of different types of texts (cf. Partington *et al.* 2004).

the simple past is preferred. These findings are certainly interesting, also because they go beyond a merely quantitative description. Their main shortcoming, however, is the lack of a close link to specialized discourse, since the same tenses may also occur in general texts. Results on the use of past rather than present tense in laboratory equipment descriptions may also be applied to general texts, whenever a single operation in the past is set against a state of permanent use. The three authors reach a remarkable conclusion, applicable to any type of text and not only to specialist settings:

> This example illustrates how a rhetorical consideration determines a semantic choice, which in turn governs a grammatical choice. (Lackstrom *et al*. 1970)

Lackstrom, Selinker and Trimble's research deserves a further comment. One of its main assumptions is that verb forms are chosen not according to the time axis of the events concerned but according to rhetorical factors linked to the type of text and topic. As evidence of this hypothesis, they examine such 'non temporal' texts as equipment description, video captions and a report on published research. However, as Comrie (1985) aptly observes, time is a key element underlying any choice of verb tense, irrespective of the context involved. It may also be added that the notion of generality associated by the three researchers to the choice of tense in the equipment description is itself time-dependent upon events that occurred once or more in the past or else occur regularly in the present.

An interesting point identified by these studies on verb tense in specialized discourse is the higher number of non-finite forms encountered than in general language. Rumszewics (cited in Barber 1985) found that these account for 35% of all verb forms in specialized texts, while they are only 17% in general texts. This finding is in line with Barber's (1985) figure of 39%, which, however, is less reliable because it counts all -*ing* forms, including those with a nominal or adjectival function, among non-finite verbs.[6] This wide use

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6   Indeed, here are some of the examples quoted by Barber (1985: 11, my italics): "Resistance *welding* is performed by *passing* a very heavy current through the pieces of metal to be joined", "In this way, exposures *extending* even over several successive clear nights can be made, the plate-holder *being*

of non-finite verbs is not surprising, since these help to compact the text's expressive form. Thus, for example, the present participle is often employed to avoid relative clauses, as in the following case:

(72)   More and more research laboratories have installed computing services operating in conversational mode. (= More and more research laboratories have installed computing services which operate in conversational mode.)

The -*ing* form also simplifies secondary concessive clauses, as it does not require the explicit mention of the subject when the latter is the same as that of the main clause:

(73)   Although sometimes causing a slowdown in work, buses are commonly used in transmitting impulses to their various addresses. (= Although they sometimes cause a slowdown in work, buses are commonly used in trasmitting impulses to their various addresses.)

The conciseness of this verbal form is so highly appreciated that it is frequently used also when the subject of the secondary clause is different from that of the main clause. In the following sentence, for example, the author uses the -*ing* form so as to avoid the coordinated clause *and the charge is* or the subordinated clause *as the charge is*:

(74)   To explain this remarkable behaviour each electron is considered to possess an electric charge, the charge being a numerical measure of the force of repulsion experienced between two electrons.

In the previous quotation another non-finite form may be observed, i.e. the infinitive. The use of this verbal form is not rare; on the contrary, it occurs more frequently than in general language as it shortens the wording of the text. For instance, in the following sentence, the infinitive is the result of the elimination of a relative clause:

(75)   The record to be located is searched in the file. (= The record which is to be located is searched in the file.)

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shielded from the daylight and the instrument *set* again, with the aid of the *guiding* star, upon exactly the same point of the heavens as before."

Another non-finite form very frequently used in specialized discourse is the past participle, as it may perform several functions. In the following sentences, for example, it is the result of the simplification of passive forms:

(76)   If allocated consecutively, data can be read one after another. (= If they are allocated consecutively, data can be read one after another.)

(77)   When inserted, the data will appear on the screen. (= When they are inserted, the data will appear on the screen.)

Suppression of subject and auxiliary is also possible with progressive forms. In this case the resulting verb is a present participle:

(78)   When typing a text in at the keyboard, the operator does not have to worry about getting to the end of a line. (= When he is typing a text in at the keyboard, the operator does not have to worry about getting to the end of a line.)

The *-ing* form is often used in specialized discourse as it allows great simplifications of the sentence, as the following examples (from Bartolic 1988: 51) show:

(79)   This results in the current being lower than if inductance were not present. (= The result of this is that the current is lower than if inductance were not present.)

(80)   Because this resistance is very small, it is sometimes ignored, and the capacitor is then considered as having reactance only. (= Because this resistance is very small, it is sometimes ignored, and the capacitor is then considered as if it had reactance only.)

Clearly, all verb forms in this section are also acceptable in general language (like any transformation leading to simplified sentence structure). But while finite verb forms reach frequencies comparable with those of general texts, non-finite verb forms occur twice as often in specialized texts because of their greater potential for streamlined, more concise sentences.

9. Use of the passive

Another widely-investigated feature of specialized discourse is its considerable use of passive verbs. Data from different statistical-quantitative studies are quoted as evidence of this observation. Barber's (1985) analysis gives a figure of 28% for passive forms as a proportion of all verb forms in the scientific texts forming his corpus. The result is confirmed in Rumszewicz (cited by Barber 1985), which found 26% of passive forms in specialized texts, compared to only 3% in general texts. This finding is confirmed by Huddleston (1971), who found 26.3% of passive forms in specialized texts. The percentage is especially high in English, where the passive is the main device used to depersonalise discourse (whereas Italian has the impersonal operator *si*, French has *on*, German *man*, etc.). The pervasiveness of the passive may be accounted for by its usefulness as a depersonalising device in specialized discourse, which generally emphasises the effect or outcome of an action rather than its cause or originator. Significantly, the agent is normally omitted in passive clauses, also because it is often the same for all the operations described. For example, texts reporting the different stages in an experiment have the same researcher or team of researchers performing all the procedures. In such cases specification of the agent becomes a redundant feature. Sometimes the agent is omitted because there is no specific actor behind a given action: this accounts for stative verb forms expressing a condition rather than an event. Their surface form is similar to the passive but with the past participle used adjectively. Here are a few examples in English:

(81)   The system is composed of .....
        The plate was located at .....
        The sensor is housed in ....

The passive is also important in textual terms, as it is normally employed to thematize the process, fact or action mentioned in a previous sentence, which makes the flow of information more effective and natural. The passive allows the thematic element to identify given information, while new information is normally

presented rhematically. This sequence appears perfectly natural and the two elements are inverted only if the agent needs to be emphasised as the focus of an utterance.

No purely syntactic explanation can account for the switch between active and passive voice, which also reflects complex pragmatic and textual functions. Both forms may be used within the same text for different communicative purposes. For example, in research articles the Methods section contains a high number of passive forms, while the Literature Review has a prevalence of active verbs. This choice can be explained by the different thematic function played by agentive noun phrases in each section. In Methods, noun phrases referring to the research itself (e.g. *the researcher*, *the experimenter*, *the present author*, etc.) cannot be emphasised because the focus is on the process concerned, which is thematized by the passive forms. But when the research is compared to earlier studies, its authors are emphasised and placed in focal position by active forms. Tarone *et al.* (1981) investigated passive vs. active verbs as employed in English astrophysics journals. Their analysis indicates that both forms are common, albeit with different functions. The active voice identifies a procedural option developed by the author(s), while the passive suggests a standardized common procedure. When the subject is expressed by personal pronoun *we*, authors emphasise the originality of their contribution or approach. For example:

(82)   In this paper we develop the theory of time-dependent disks. The underlying physics is essentially the same as that of the stationary models above, except that we allow variables to evolve in time on the 'drift' (radial flow) time scale. (Tarone *et al.* 1981: 129)

As mentioned above, the active voice is used to describe the author's actions, while the passive refers to the actions of others; when the two are in conflict, however, the active form is used also for results obtained by other researchers. In the following texts, the data of other researchers are rejected by the author and will be disproved by new research. The author prefers to place the emphasis on the object of criticism, putting his peers in subject position:

(83)   In fact, Pringle (1974) and Cunningham (1973) have developed models of vertical structure which suggest that the inner region of the disk is convectively unstable. (Tarone *et al.* 1981: 132)

(84)   Rees has pointed out (see Pringle *et al.* 1973) that failure of the above requirement leads to a thermal instability. (Tarone *et al.* 1981: 132)

Tarone *et al.* (1981) have drawn attention to the principles that determine the choice between active and passive forms when referring to previous research positively (passive voice), negatively (active) or in contrast to the author's results (active). On the other hand, when an author mentions his future work, he generally opts for the passive. This emphasizes the need for further research efforts to fill gaps or overcome unsolved difficulties in existing knowledge; here a more objective form avoids thematic reference to the writer. See, for example, the following cases:

(85)   This will be dealt with in a succeeding paper. (Tarone *et al.* 1981: 133)

(86)   Whether such a situation is stable under perturbations will be investigated in Paper II. (Tarone *et al.* 1981: 133)

Tarone *et al.* (1981) also observe that the choice between active and passive forms may be influenced by sentence length or by the need for special prominence. Indeed, the syntactic rules of the English language allow for different textualisations of the same concept, whether through active/passive forms, adjectivation, nominalization or other linguistic devices as in the example below:

(87)   We can divide 9 by 3 without a remainder.
        9 can be divided by 3 without a remainder.
        9 is divisible by 3 without a remainder.
        The division of 9 by 3 leaves no remainder.

The choice is determined by pragmatic-textual factors rather than syntactic considerations. Their importance in the textualisation process varies according to the type of text or specialized field and cannot be generalised. As remarked earlier, the widespread use of the passive in specialized discourse described by linguists is not common to all text types. The legal writings examined here (cf. appendices to

this volume) also have a lower proportion of passive forms than claimed by Barber, Huddleston and others (cf. also Williams 2005). In legal contracts, for example, what matters most is not the set of rights and duties established between the parties but rather the specific people bound to such rights and duties. When stressing the personal nature of legal obligations, the best option is the active voice, which places the actor in thematic position. Here are a few of the many instances found in the two texts considered:

(88)   The Landlord lets and the Tenant takes the Property for the Term at the Rent payable as above (1: 29-30)

(89)   The Tenant will [...] Pay the Rent at the times and in the manner specified (1: 40-41)

(90)   The Tenant will [...] Not manage or injure the Property or make any alteration in or addition to it (1: 40-49)

(91)   The Tenant will [...] Preserve the Fixtures Furniture and Effects from being destroyed or damaged and not remove any of them from the Property (1: 40-51)

(92)   The Member Firm agrees, both during and after the term of this Agreement, to cooperate fully and in good faith with Grantor (2: 106-108)

(93)   The Member Firm shall notify Grantor in writing, of any infringement, imitation, passing off or use of the Service Marks or any confusingly similar marks by any third party which comes to its attention. (2: 113-116)

(94)   The Member Firm shall conduct its affairs in a manner consistent with the professional standards set forth in the DJRW Statutes and any regulations thereto to the end of maintaining the prestige and high professional standards associated with the Service Marks (2: 133-137)

10. Depersonalisation

In these examples, the pervasiveness of passivization coupled with the absence of an explicit agent suggests the presence in specialized texts of a tendency to depersonalise discourse. The phenomenon is

confirmed by inspection of various specialized texts based on a positivist empirical approach. Their objectivity rests on the assumption that principles and properties are suggested to the scientist by direct observation of phenomena. This inductive process is realised linguistically by reduction of the human element and personalisation of the experiment's physical aspects. In expressive terms, the phenomenon is signalled by such typical research-process verbs as *demonstrate, suggest, highlight, indicate, confirm*, etc. with inanimate subjects consisting of facts, events and elements.

In a study on this subject, Halliday (1988) points to the constant depersonalisation of English scientific language, a trend which has produced over the centuries a whole range of variously personalised different forms. Thus, for instance, the prevalence of such personalised forms as *Smith suggested that* has given way to an increasingly marked use of nominalization, with the main clause and its infinitive compressed into a complex noun phrase which can serve as subject of another clause. This development has gone through an intermediate stage with copula (*Smith's suggestion was that*), followed by its omission (*Smith's suggestion that*). This marks the apex of depersonalisation, as verb phrases like *is confirmed by* or *conflicts with* acquire a non-personal subject as *suggestion*.

Increased use of depersonalisation is also confirmed by a very common feature of specialized texts: the author referring to himself indirectly through third-person pronouns and such noun phrases as *the author, the research team* and others, or conveying his personal views to personalised forms of the type *the book investigates, this article demonstrates*, etc. A trend to depersonalisation is observed not only in omission of the subject-speaker, but also in the reduction of any direct reference to the interlocutor. As shown by Todd Trimble and Trimble (1978) for English instruction manuals, the addressee is avoided through indirect forms and the use of passive modals. In the following example, for instance, the interlocutor is not mentioned, while the focus of the message is placed on the action's consequences:

(95a)   Steel weld backing should be sufficiently thick so that the molten metal will not burn through the backing.

Although it does not refer to the consequences of the action in an explicit way, this sentence implies a precise instruction as to how that action should be performed. The following sentence shows how this pragmatic function could be expressed:

(95b) If steel weld backing is not sufficiently thick, the molten metal will burn through the backing.

This sentence presupposes the following, in which the deontic aspect is much more evident:

(95c) The steel weld backing must be sufficiently thick to avoid burning through the backing.

The instruction underlying the sentence drawn from the instruction manual is therefore the following:

(95d) You must make the steel weld backing sufficiently thick or the molten metal will burn through the backing.

Clearly, any direct reference to the interlocutor has been reduced by a depersonalisation process involving various stages. As observed with other phenomena, depersonalisation cannot be considered a general feature of all specialized discourse. In argumentative texts, for example, first-person pronouns (whether singular or plural) are used more often when referring to the locutor, because the emphasis is often on authorial autonomy within the discipline.[7] The use of first-person pronouns is indicative of the effort to convince the reader by emphasising the argumentative structure of discourse, as in the following passage:

(96) I have called [...]. I mean by this [...]. And I argue that [...]. Let me give an example of what I mean. My contention [...] is [...]. But this, I have to point out, [...]. (Keynes 1936 / 1973: xxxii)

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7 As Hyland (1999) has shown, academic writers employ first person markers for three main purposes: i) to organise arguments and structure their texts; ii) to introduce or discuss research activities; or iii) to explicitly indicate their attitudes to findings or align themselves with theoretical positions.

In argumentative specialized texts the author sometimes emphasises his presence in the text so strongly that it becomes fragmented, interrupted by repeated digressions and parenthetical clauses:

(97)   The classical theory of employment – supposedly simple and obvious – has been based, I think, on two fundamental postulates, though practically without discussion, namely: […]. (Keynes 1936 / 1973: 5)

Even in argumentative specialized monographs, especially in the hard sciences, there is, however, a general trend to make the language more indirect and less personal. This behaviour of specialists is confirmed more or less explicitly by their own statements. The Nobel laureate P.W. Bridgman, for example, devotes two entire pages of his book *The Way Things Are* to justifying his choice to express personal opinion using first-person pronouns. In particular, it is noticeable that an author's notoriety increases self-confidence and the use of a more personal style. Very often behind these depersonalised forms lurks the author's fear of accountability. An example of this attitude is found in a statement cited by Gilbert and Mulkay (1984):

> Everybody wants to put things in the third person. So they just say, 'it was found that'. If it's later shown that it was wrong, they don't accept any responsibility. '*It* was found. I didn't say I *believed* it. *It* was found.' So you sort of get away from yourself that way and make it sound like these things just fall down into your lab notebook and you report them like a historian. (Gilbert / Mulkay 1984: 58)

Once again we are confronted with different types of behaviour among authors, each leading to special syntactic options which in turn reflect a given pragmatic orientation. As in the previous chapter, our analysis of the main features of specialised discourse helps interpret in depth the linguistic options chosen – sometimes subconsciously – by specialists when drafting a text. In particular, the investigation of syntax is extremely useful for understanding specialists' behaviour because the syntactic construction of a language provides key evidence of its organisation of logical thought.

IV. Textual Features

There are a number of features that distinguish specialized texts also from the textual standpoint. Many of these are peculiarities shared by all types of text – not only in specialized fields – and do not constitute a typological exception but rather a distinction in quantitative terms. In some cases, however, specialized texts seem to avoid the use of standard textual norms in favour of 'deviant' options whose motives this chapter seeks to address. It also reviews other peculiarities attributed to specialized discourse by previous studies, with an assessment of their accuracy. These similarly include exceptions that signal an analogy between certain specialized genres and other more general text types.

1. Anaphoric reference

Various studies have shown that anaphoric reference is one of the most common devices deployed to increase textual cohesion (cf. Halliday / Hasan 1976, ch. 2). In conjunction with other referential phenomena, alongside ellipsis, substitution and lexical cohesion, it forms the textual framework which – combined with suitable cohesive devices – accounts for a text's constituent features. This phenomenon is familiar in common language but far less so in specialized texts: in legal writing, for example, it is normally avoided in favour of lexical repetition. An illustration of this is the following paragraph taken from the Appendix to this volume:

(1)   The Member Firm shall notify Grantor in writing, of any infringement, imitation, passing off or use of the Service Marks or any confusingly similar marks by any third party which comes to its attention. The Member Firm, as licensee, shall have the right to decide whether or not proceedings shall be brought by the Member Firm against any such third parties. In the event that it

is decided that action should be taken against any such third party, the
Member Firm may take such action in its own name. If the Member Firm
chooses not to bring proceedings against any such third party, Grantor shall be
entitled to bring proceedings in the name of the Member Firm and, in such
event, the Member Firm agrees to cooperate fully with Grantor to whatever
extent it is necessary or appropriate to prosecute such action. All legal costs
shall be borne by the Member Firm and any damages awarded shall be
equitably apportioned on the basis of damages suffered and costs incurred. (2:
113-131)

Here the repetition of such lexical items as *Member Firm*, *Grantor*
and *any (such) third party / parties* is far more acceptable than
anaphoric reference through personal pronouns. This preference –
observed already in Crystal / Davy (1969) – stems from the need for
maximum clarity and avoidance of ambiguity, a typical trait of legal
discourse mentioned earlier and confirmed by the texts in the
Appendix. In the following, for example, the repetition of *Landlord* in
the possessive form, instead of the possessive pronoun *his / her*, seeks
to avoid the anaphorical reference of *agents* to the word *Tenant* in
subject position:

(2)   [The Tenant will] Permit the Landlord or the Landlord's agents at reasonable
        hours in the daytime to enter the Property to view the state and condition
        thereof (1: 63-64)

(3)   [The Tenant will] Permit the Landlord or the Landlord's agents at reasonable
        hours in the daytime within the last twenty-eight days of the tenancy to enter
        and view the Property with prospective tenants (1: 75-77)

In the following quotation, the repetition of the lexeme *Property*
instead of its referent *it* helps to avoid the possibility that this pronoun
might erronously be made to refer to *notice board* or *notice*:

(4)   [The Tenant will not] place or exhibit any notice board or notice on the
        Property or use the Property for any other purpose than that of a strictly
        private residence (1: 68-70)

At times, however, there is excessive recourse to lexical repetition
even in cases where the risk of ambiguity is very slight or inexistent,
as in the following example, where the use of the postmodifier *of the
Landlord* instead of the possessive adjective *his / her* is hardly

justifiable, as it is obvious that the *other rights and remedies* mentioned cannot be attributed to a defaulting tenant:

(5)   Provided that if the Rent or any instalment or part thereof shall be in arrear for at least fourteen days after the same shall have become due (whether legally demanded or not) or if there shall be a breach of any of the agreements by the Tenant the Landlord may re-enter on the Property and immediately thereupon the tenancy shall absolutely determine without prejudice to the other rights and remedies of the Landlord (1: 78-83)

The same remark can be made about the following quotation, in which the expression *on the part of the Tenant* could be rewritten *on his / her part* without giving rise to any ambiguity, as the word *agreements* is the object of the present participle *performing*, which in turn is syntactically coordinated with *paying the Rent*; indeed, since the party paying the rent is the tenant, there is no risk of misinterpreting the referent of the word *agreements*:

(6)   [The Landlord agrees with the Tenant as follows –] That the Tenant paying the Rent and performing the agreements on the part of the Tenant may quietly possess and enjoy the Property during the tenancy without any lawful interruption from the Landlord or any person claiming under or in trust for the Landlord (1: 89-92)

This frequent – and at times unjustified – recourse to lexical repetition also takes place in those rare cases in which the text employs anaphorical referential elements. For example, in the following quotations – along with the relative pronoun *which* – the lexical element being referred to is also mentioned:

(7)   Whereas, Grantor is the owner of the name "Dale Johnson Ryder Warren" and certain service marks set forth in the attached Appendix A, and has been granted the right to sublicense derivatives thereof, that is, marks and names which use any one or more of the component names "DALE", "JOHNSON", "RYDER" or "WARREN" alone or in combination with other names or marks (which names and marks are referred to collectively as, "Service Marks"); (2: 8-15)

(8)   Whereas, the Service Marks are used by the Member Firm in connection with the providing and advertising of services in the fields of auditing and accounting, taxation, management consulting and other related areas and are sometimes used on products related to such services (which trademark uses are

intended to be included within the definition of Service Marks as used herein); (2: 16-22)

This need for precision lies at the base of another relevant characteristic of legal texts, that is, the frequent recourse to the reference to the parts of the text itself, specifying in the clearest way the textual element being referred to. Notice, for example, the frequent use of the 'textual-mapping' (Bhatia 1987) adverbials *hereto, herein, hereof* and *thereto* in the following sentence:

(9)   Whereas, Johnson Ryder Archer & C., Johnson Ryder Chester & C., Dale Johnson Nelson & C., Dale Johnson Stokes & C., Grantor, Johnson Ryder International a partnership, and Dale Ryder Warren an association, have entered into the Component License Agreement, effective as of April 1, 2002 ("Component License Agreement"), a copy of which is attached hereto as Appendix B (without Appendices A and B attached thereto which are Appendix A hereto and a form of this Agreement) and made a part hereof as if fully recited herein and to which the Member Firm agrees to be fully bound as if originally a party thereto; (2: 47-57)

These adverbials generally refer to a document or a part of it and specify its exact location or identification; in other cases they accompany past participles which otherwise might be interpreted erroneously. Here are some examples:

(10)   In section 21 thereof (1: 33)
        The hands of the parties hereto (1: 101)
        The day and year first above written (1: 101-102)
        By the license granted hereby (2: 34)
        Any regulations thereto (2: 40)
        Agreed by the parties hereto (2: 42-43)
        Fully recited herein (2: 55)

The need for maximum precision in legal language is confirmed by exophoric reference, with detailed specification of any contextual item mentioned in the sentence. An example of this is the unnatural effect, in everyday sentences containing vocative forms, of the interlocutor's surname when enquiring about his identity. Philips' (1987) corpus provides interesting instances of this use:

(11)   JUDGE: Uh, Richard Reichenstein, (4 sec.pause) Is Richard
                        Reichenstein your true name, sir?
        DEFENDANT: Yes, sir. (2 sec. pause)
        JUDGE: Ms. Miller, is your true name Elizabeth Miller?
        DEFENDANT: Yes, it is, your Honor. (2 sec. pause) (Philips 1987: 88-89)

Quite often specialized discourse not only deploys textual items to
clarify or specify the relationship between different parts of a sentence
but also uses cohesive devices to illustrate textual organisation or
authorial intention more clearly. In this case lexical anaphora has a
pragmatic function, insofar as it does not replicate the semantic side of
the repeated concept but clarifies its illocutionary value. For example,
in the following paragraph the first sentence is not necessarily
understood as a proposal. Its intended meaning is conveyed by the
anaphoric expression *this proposal*, which occurs in the second
sentence:

(12)   The way to solve some problems connected with congestion in air traffic is to
        raise prices at peak times and lower them at others. This proposal is based on
        nothing more than the principles of demand and supply. (Merlini 1982: 192)

As Merlini keenly observes, anaphora does not simply refer back to
the semantic value of the previous sentence but also to its
performative value and specifies its illocutionary orientation. The fact
that an author prefers to suggest pragmatic value indirectly through a
noun phrase *(this proposal)* rather than a verb phrase (*I propose*)
confirms the familiar tendency to nominalization and no explicit
authorial presence in the text.

2. Use of conjunctions

The same point may be made about the use of conjunctions. These
items not only add cohesion to texts but also have a pragmatic
function, which clarifies the purpose of the sentence that follows. For
instance, after such expressions as *but, however, on the other hand*
and so forth, one expects a sentence semantically opposed to the

previous one, with conjunctions like *as, since, for, because* and others generally introducing a reason or explanation. It is notable again that legal language strongly emphasises the pragmatic function of connectives by making meaning more transparent through inclusion in the surface form of a lexeme denoting their illocutionary value. An instance of this may be seen in the following sentences from the Appendix, where the part in italics is often a more transparent paraphrase of common connectives:

(13)   NOW, THEREFORE, *in consideration of* the premises and of the mutual covenants hereinafter set forth the parties agree as follows: (2: 58-60)

(14)   The Member Firm agrees, both during and after the term of this Agreement, to cooperate fully and in good faith with Grantor and to execute such documents as Grantor reasonably requests *for the purpose of* securing and preserving Grantor's rights in and to the name "Dale Johnson Ryder Warren" and to the service marks set forth in the attached Appendix A. (2: 106-112)

(15)   *In the event that* it is decided that action should be taken against any such third party, the Member Firm may take such action in its own name. (2: 119-122)

As the most common connectives may have several uses (and pragmatic values) despite their expressive conciseness, their place is often taken in legal texts by a longer but more pragmatically transparent paraphrase. Textualization is subservient again to pragmatic requirements, as the need to ensure a single clear-cut interpretation prevails over text length.

3. Thematic sequence

Some studies of specialized discourse focus on the thematic structure, i.e. the sequence of thematic items (introducing topic or theme) and rhematic items (containing what is said about the theme) (cf. Halliday 1973). This division overlaps with the distinction between 'given' (an item of information known to the addressee) and 'new' (information that is not found in the preceding text or context). The 'given' item is often, but not always, the same as the theme. In English the theme of

unmarked sentences is generally their subject and occurs initially. A standard paragraph sequence has each new theme referring back to the rheme of the previous sentence, according to the following pattern (Figure 1):

$$T_1 \searrow R_1$$
$$| $$
$$T_2 \searrow R_2$$
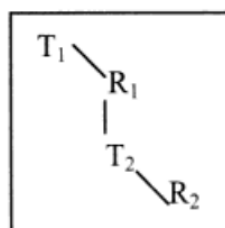
Figure 1. Standard thematic sequence.

The sequence of thematic and rhematic items in the text makes discourse both cohesive and coherent. This is not the only pattern found in English: it has several variants. The thematic structure is parallel, for example, when its different themes refer to the same opening theme. The diagram is then of the following type (Figure 2):

$$T_1 \searrow R_1$$
$$| $$
$$T_1 \searrow R_2$$
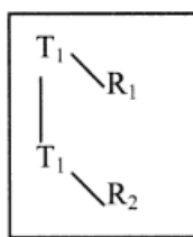
Figure 2. Parallel thematic sequence.

A clear example of this model is the text below (an abridged version of Keynes 1936/1973: 3), with the thematic position of the subject *I* stressing the author's critical stance towards the existing theory and his effort to prove the innovative nature of his work:

(16)   I have called this book the *General Theory of Employment, Interest and Money*. I have placed the emphasis on the prefix *general* to contrast the character of my arguments and conclusions with those of the *classical* theory. I have become accustomed, perhaps perpetrating a solecism, to include in 'the classical school' the followers of Ricardo, including (for example) J.S. Mill, Marshall, Edgeworth and Prof. Pigou. I shall argue that the postulates of the classical theory are applicable to a special case only and not to the general

case, the situation which it assumes being a limiting point of the possible positions of equilibrium.

Besides these regular structures there are others based on their variations and combinations. Figure 3 is a model taken from Hutchins (1977), in which the rheme of the first sentence originates two different themes:
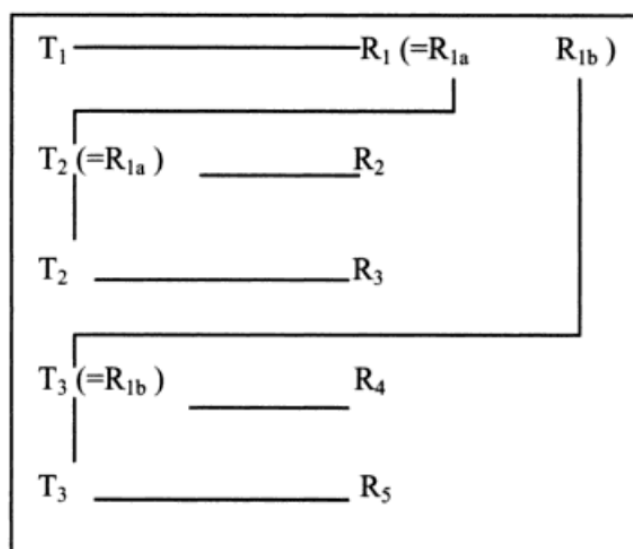
Figure 3. Hutchins' (1977) thematic sequence.

A text based on this sequence is the following:

(17)   All substances (T1) are divided into two classes: elementary substances and compounds (R1= R1a + R1b). An elementary substance (T2 = R1a) is a substance (R2) which (T2) consists of atoms of only one kind (R3). [...] A compound (T3 = R1b) is a substance (R4) which (T3) consists of atoms of two or more different kinds (R5). (Hutchins 1977: 21)

Generally speaking, one can observe that in his thematic structure the specialist adopts the same conventions commonly employed in general language. This is the conclusion Kurzon (1984) comes to at the end of his analysis of the thematic structure of five types of legal texts:

What this seems to suggest is that legal texts do not present an exceptional case as far as the organization of elements within the sentence is concerned,

since theme and rheme correspond to given and new information, respectively, unless there is a good reason otherwise. (Kurzon 1984: 49-50)

There are cases, however, when the specialist appears highly aware of the advantages of placing certain information items in thematic rather than rhematic position or vice versa, and through skilful use of such devices he is able to enhance the text's pragmatic values. Pettinari (1983), for instance, has shown that in surgery reports the subject switches from thematic to rhematic position according to mainly pragmatic principles. It is thematic every time the surgeon considers an item referred to by the subject of importance to the surgical operation performed. Any information considered of secondary importance, however, is given rhematically. In his analysis of the last two sections of Darwin's *Origin of Species*, Halliday (1990) points out that the text's thematic pattern allows the author to appear as an authority on the subject. The passage quoted is the following (thematic part in italics):

(18)   *Authors of the highest eminence* seem to be fully satisfied with the view *that each species* has been independently created. *To my mind it accords better with what we know of the laws impressed on matter by the Creator, that the production and extinction of the past and present inhabitants of the world* should have been due to secondary causes, like those determining the birth and death of the individual. *When I* view all beings not as special creations, but as the lineal descendants of some few beings which lived long before the first bed of the Silurian system was deposited, *they* seem to me to become ennobled. *Judging from the past, we* may safely infer *that not one living species* will transmit its unaltered likeness to a distant futurity. [...] *We* can so far take a prophetic glance into futurity as to foretell that it will be *the common and widely-spread species, belonging to the larger and dominant groups*, which will ultimately prevail and procreate new and dominant species. (Halliday 1990: 71-72)

There is clearly a thematic progression that gradually shifts the weight of authority from early scientists who rejected evolutionism to Darwin himself and his proposals, through the sequence: *authors of the highest eminence – the Creator (to my mind) – I – we.*

4. Text genres

One of the phenomena that most distinguishes specialized discourse is compliance with the norms governing the construction of its different text genres.[1] There is usually a close link between the type of specialized text and its structure, which in turn implies a number of correlations between the conceptual, rhetorical and linguistic features that characterize the text itself. Genre not only provides a conventional framework but also affects all other textual features (with an overall pragmatic function, e.g. report, information, discussion, etc.) and constrains their conceptual and rhetorical development, which in turn determines the linguistic choices made as the text unfolds. With time, several text types have arisen – some derived from genres common in general language, others crafted specifically to meet the needs of specialists. In the 1600s and 1700s, for instance, there was a considerable growth in scientific newspapers and academic proceedings, which explains the success of shorter, more publishable genres such as the experimental essay (cf. Chapter 6), memorandum or letter, which coexisted with earlier, less manageable genres (not suitable for newspapers, journals or collective volumes) like the treatise, dissertation, textbook, dialogue, diary, etc. Despite the rather high number of text genres in use, new text types are added every year to the list. One of the latest additions is the *executive summary* written for top managers. In the business world, the need to economize on time means that executives generally avoid reading long papers or reports; instead they ask a subordinate to inspect the document and draw up a summary of the main points required for decision-making.

Another text form widely adopted in recent years is the *abstract* – the summary of an article published in a scholarly journal or of a

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1   The several studies on specialized genres include the following: Bargiela-Chiappini / Nickerson (1999), Berkenkotter / Huckin (1995), Bhatia (1993, 2004), Bhatia / Candlin / Gotti (2003), Bondi (1999), Christie / Martin (1997), Gillaerts / Gotti (2005), Gläser (1995), Hyland (2000), Johns (1997), Noguchi (2005), Sarangi / Coulthard (2000), Swales (1990, 2004), Swanson (2003), Trosborg (2000).

paper presented at a conference.[2] Its appearance and success is due once again to the huge number of publications available (some 50,000 scholarly journals published every year, for a total of 5 million articles), which place a limit on the number of texts that a single reader can inspect. The abstract provides readers with a short summary that shows whether a topic is relevant and worth the time required to read the whole article. The success of this genre in conference programmes is due, on the other hand, to the high number of papers presented – often in parallel sessions – at such events, which forces participants to choose which presentation to attend. Through training and professional engagements, specialists learn to follow given norms and patterns in each type of text; the conventional use of genres also produces certain expectations among their audience, and whenever the rules are broken a text is misunderstood or rejected.

Such conditions are followed very closely in specialized texts, even when the reasons underpinning certain features no longer exist. An example of this phenomenon is the textual construction of English legal documents. In recent contracts it is increasingly common to divide a text into numbered sections, with more punctuation and spaces between sections, but in many instances (as demonstrated by the two texts in the Appendix) the same devices are either omitted or occur only occasionally. This is due to a custom established before the invention of printing: writing across each line from margin to margin, without any punctuation, to avoid additions or alterations of the original meaning. (on the use of punctuation in legal documents cf. Mellinkoff 1963: 152 ff.; on the division of the text into blocks of print cf. Crystal / Davy 1969). Such conventions have in part survived to this day, although printing makes text alteration far more difficult. Thus the first text in the Appendix to this volume, for example, closely follows the legal tradition of avoiding most punctuation marks: it has no full stops at the end of paragraphs and no commas or other marks in between, apart from a few brackets, inverted commas and dashes. The second text in the Appendix follows instead the standard layout of English legal documents – with the different

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2   The abstract has been studied by several scholars; to name just a few: Andersson / Gunnarsson (1995), Busch-Lauer (1995), Gläser (1991), Melander *et al.* (1997), Salager-Meyer (1990, 1992) , Swales (1990).

sections in separate blocks (preconditions, introduced by *WHEREAS*, are placed between a verb, in the archaic form *witnesseth*, and *that*-clauses specifying contractual provisions). This layout does not always follow the textual rules of standard language (cf. for example the conjunction *and* introducing a new paragraph which is in fact a continuation of the previous one in parts 2: 40-41 e 2: 46-47). This arrangement in blocks is typical of English legal documents and diverges from the standard division applied to general discourse and other specialized texts, which are normally divided into paragraphs. The paragraph does not only reflect a conceptual unit within the text but also performs a special pragmatic function. The physical layout itself on the page replicates the conceptual-pragmatic dimension, favouring the identification of separate text parts and highlighting their functions and interactions: this improves comprehension of textual organisation and makes the meaning easier to decode.

As shown by Trimble (1985), however, in specialized discourse there is not always a perfect match between the conceptual and physical dimension of paragraphs; indeed, the 'conceptual paragraph' (built on a unitary concept) may be inconsistent with the 'physical paragraph' (notable for its typographical layout). Sometimes the main point is expressed in one paragraph and investigated in the following one; sometimes it is not expressed explicitly but has to be inferred from the details provided (an 'implicit paragraph'). Trimble's claims have been confirmed by Baumann's (1990) analysis of specialized discourse, which clearly shows that the ratio between physical and conceptual paragraphs seldom exceeds 1:1. His data are given below (cf. Table 1):

LSP text form	Historiography	Linguistics	Psychology	average
Monograph	23.07	81.80	47.27	50.71
Scientific article	46.80	16.00	25.25	29.35
Textbook	0	15.38	25.92	13.76
Essay	9.52	26.76	3.57	13.28
Average	*19.84*	*34.98*	*25.50*	

Table 1. Baumann's (1990: 25) ratios between conceptual and physical paragraphs; data obtained by multiplying the number of conceptual paragraphs by 100 and dividing the result by the number of physical paragraphs of the proper text.

As for the structure of different textual genres, Van Dijk (1977) showed that they normally follow a clearly codified, widely accepted pattern. For instance, the research article usually consists of INTRODUCTION – PROBLEM – SOLUTION – CONCLUSIONS. In the social sciences, e.g. psychology, the standard sequence is INTRODUCTION – THEORY – PROBLEM – EXPERIMENT – COMMENT – CONCLUSIONS. Further divisions occur within each part: e.g. the EXPERIMENT section may be subdivided into PROJECT – METHODS – MATERIALS – RESULTS. As Van Dijk aptly remarks, the role of each subsection is pragmatic as well as semantic:

> Thus the PREMISE – CONCLUSION structure not only has semantic properties (*eg.* implication of the latter by the former), but also determines the structure of the ACT of arguing: a conclusion is drawn, an inference made. (Van Dijk 1977: 245)

This means that the quality of textual organisation facilitates comprehension of content but also of the pragmatic function of each section: some are informative, others evaluative, or predictive, etc. These tend to form standard sequences that typically reflect the specialist's theoretical or practical activities. One such sequence identified by Merlini Barbaresi (1988) is ANALYSIS – PREDICTION – PROPOSAL, which clearly incorporates the cognitive approach followed by an economist engaged in theoretical work:

> As an expert, he sees a problem (analysis component), foresees its consequences (prediction component), and, out of his social function, proposes a solution (proposal component). (Merlini Barbaresi 1988: 144-145)

The close interrelation between epistemological and textual aspects is a common trait of specialized discourse and makes its realisations highly codified – in keeping with a standardised argumentative pattern. As texts unfold, they reflect the specialist's heuristic approach and point to the analytical method employed in the theoretical investigation of a given issue or for the implementation of a new type of empirical test. Looking at specialised reports of scientific experiments, Hutchins (1977: 31) found the following methodological framework:

1. 'current' hypothesis / paradigm;
2. demonstration of inadequacies;
3. statement of 'problem';
4. statement of 'new' hypothesis or of alternative hypotheses;
5. testing of hypothesis or hypotheses;
6. 'proof' of hypothesis or of one of alternative hypotheses;
7. implications of 'solution'.

The first three parts may be seen as constituents of a common stage identifying the problem, whereas the other four tackle the solution to that problem. Textual standardisation occurs in all disciplinary fields and is strongest when a text is not free-standing but is the redrafting of an earlier text, incorporating all data reflecting the new conditions. This is the method followed for drafting legal contracts which, as they serve a range of recurring codified situations governed by specific norms, are often based on pre-printed forms with spaces for the parties' names and special clauses to meeet individual requirements. Even when printed forms are avoided, the alternative is a checklist of textual provisions, from which the user can draw those required in a given situation. This custom is confirmed by Kurzon's following statement:

> The texts of contracts, wills and deeds are never written afresh every time a lawyer has to draw one up. The lawyer uses what are called in the profession 'formbooks', in which documents or paragraphs of documents are set out, and it is up to the lawyer to choose the appropriate paragraph or paragraphs for the particular document s/he is drawing up. All the lawyer has to add to these documents are the personal particulars of the person or persons. (Kurzon 1989: 284-285)

A similar case is found in business correspondence, with the main types of letter generally grouped into categories according to their pragmatic function: enquiries, offers, orders, complaints, reminders, etc. Each category follows a standard pattern, with certain sections arranged in a set sequence. Besides the structure shared by all business letters – with an opening (sender's and receiver's addresses, date, reference numbers, salutation), a body (containing the letter's main content) and a closing section (greetings, signature and reference to

attachments) – there is a conventional pattern for each type of letter. For example, an order for goods is generally organised as follows:

1. reference to a previous offer;
2. order for the goods required;
3. instructions concerning packing, delivery, insurance, etc;
4. specification of the method of payment preferred.

Business letters do not normally require much creative effort on the writer's part, because the sender tends to use standardised letter formulae stored in his computer files; these are customized by adding details about the transaction concerned. The standardisation of business communication also makes texts shorter, more concise and comprehensible to the reader – a key factor in specialised transactions and global communication. Commenting on this important link between pragmatic transparency and textualization in business correspondence, Ghadessy and Webster make the following remark:

> The purpose of almost every business letter is to evoke some material and immediate response or action. A letter of enquiry or adjustment, an application for a position, a collection letter, a sales letter – all are designed to get something done. For this reason business writing is often spoken of as PERSUASIVE WRITING. In business writing the use of language must be governed by the results aimed at; it must be designed to create the proper impression upon the recipient, and thus to evoke the proper action, response and result. Another important point is that business letters are likely to get a more rapid reading than the works of literature. Consequently the business writer tries to compress his message so that it will be immediately and unmistakably clear. There must be no chance of its being misunderstood. He must prepare his letter for the eye as well as the brain. (Ghadessy / Webster 1988: 112)

5. Textual organisation

The considerable codification of specialized genres increases semantic-conceptual coherence and transparency, as signalled by textual organisation. Studies on this aspect of text have not only

highlighted its different parts but also the contribution of each part to the overall pattern. Swales (1990), for example, has analysed several genres of academic writings; a chapter of his book is devoted to research articles in English and a detailed analysis of its various parts is provided.[3] As regards introductory sections of scientific articles, he has identified a general structure, called *CARS (Create a Research Space) Model* (cf. Figure 4).

MOVE 1 – ESTABLISHING A TERRITORY
    Step 1 – Claiming centrality
               and /or
    Step 2 – Making topic generalization(s)
               and / or
    Step 3 – Reviewing items of previous research

                                           Declining rhetorical
                                             effort

MOVE 2 – ESTABLISHING A NICHE
    Step 1A – Counter-claiming
               or
    Step 1B – Indicating a gap
               or
    Step 1C – Question-raising
               or
    Step 1D – Continuing a tradition

                                           Weakening knowledge
                                           claims

MOVE 3 – OCCUPYING THE NICHE
    Step 1A – Outlining purposes
               or
    Step 1B – Announcing present research
    Step 2 – Announcing principal findings
    Step 3 – Indicating RA structure

                                            Increasing explicitness
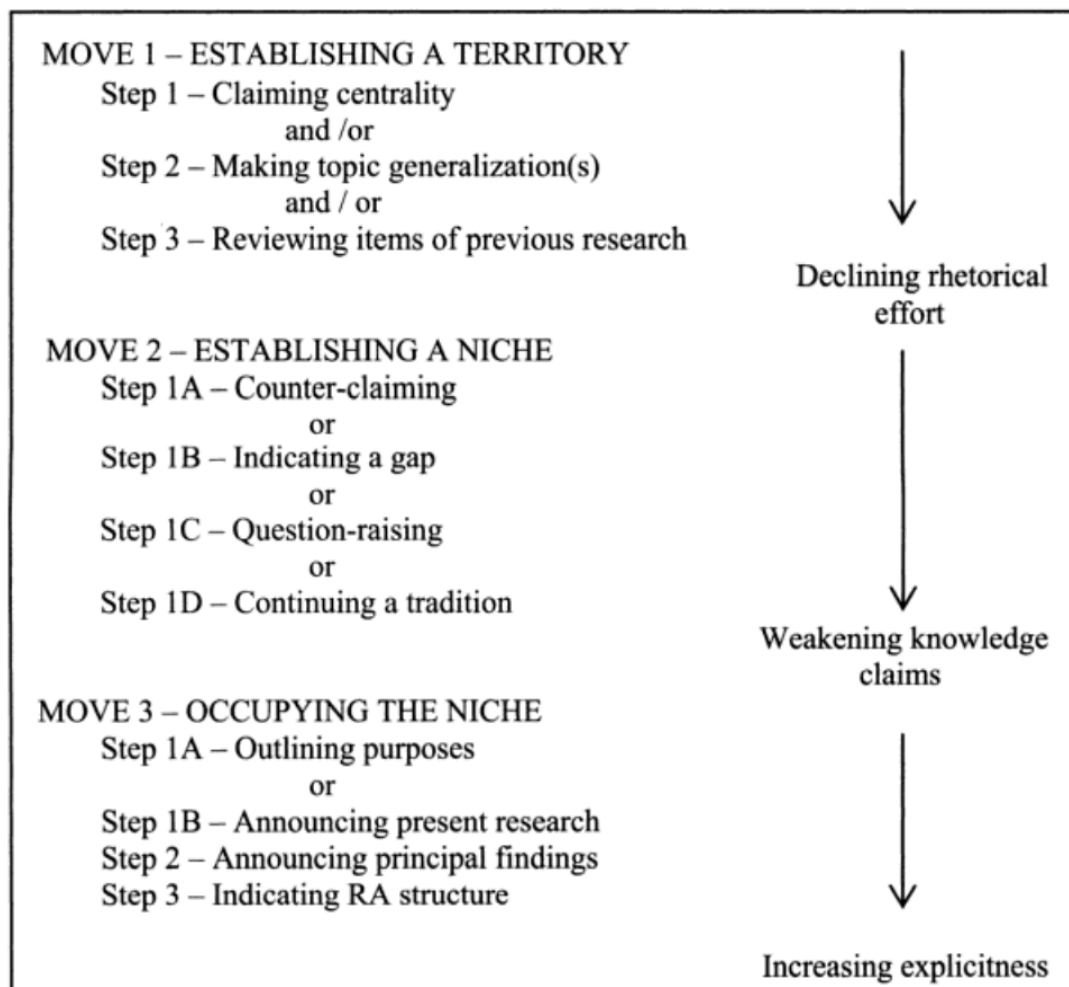
Figure 4. Swales' (1990: 141) CARS Model for article introductions.

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3   Many studies have been devoted to the analysis of research articles, among which: Bazerman (1988), Giannoni (2002), Hyland (1998, 2001), Mauranen (1993), Myers (1989).

The Introduction section of research articles has attracted in-depth analysis by other analysts, who have identified the structure of this microact and the functions of its constituents. Hepworth (1978), for example, investigated the following introduction to assess its analytical structure:

(19)   (1a1) There is now much evidence to support the hypothesis of Rich (1964) that ozone injures plants by destroying the semipermeability of cell membranes (Ting, Perchorowicz and Evans, 1974). (1a2a1) The transport of several metabolites and inorganic ions across cell membranes is altered (Ting and Heath, 1975). (1a2a2) Consequently, leakage of water and additional metabolite leads to cellular death and necrosis of tissue. [...] (1a2b1) Generally, conditions which promote good transport rates and stomatal opening predispose the plant to greater injury. (1a2b2) Various chemicals such as occidants, fungicides and growth regulators can offer protection if applied before ozone exposure (Ormond and Adepipe, 1974). (1b1a) However, very few investigators have considered the effects of postfumigation condition treatments (1b1b) because these have not been considered of much value (Heck, 1968). (2a1) In practical terms, however, it would be more feasible to apply treatment after exposure (2a2) than to predict an air pollution episode. (2b) In this paper we will argue that successful treatment of plant after ozone exposure may be feasible (Sutton and Ting, 1977).

The analytical structure that Hepworth (1978) draws from this introduction is the following (Figure 5), and highlights the binary pattern on which the text is mainly based:

PROBLEM							*however* SOLUTION		
PREVIOUS RESEARCH					DATA LACKING		HYPOTHE-SIS		PUR-POSE
	Specifically					*Because*		*rather than*	
X	Y				X	Y	X	Y	
	X		*and* Y						
	X	*therefore* Y	*true* X	*yet* Y					
1a1	1a2a1	1a2a2	1a2b1	1a2b2	1b1a	1b1b	2a1	2a2	2b

Figure 5. Hepworth's (1978, quoted in Swales 1981: 82) analysis of an introduction.

Adopting Hoey's (1979) model – structuring a specialized text according to a sequence of three main macroacts: SITUATION-

PROBLEM-SOLUTION – Hepworth's introduction could be summed up in the following sequence:

- SITUATION: 1a1 - 1a2b2.
- PROBLEM: 1b1a - 1b1b.
- SOLUTION: 2a1 - 2b.

As pointed out by Swales (1981), however, Hepworth's pattern – and its revision according to Hoey's model – may be misleading because the theoretical issue stressed in the Introduction is only mentioned at the beginning of the article (and not always explicitly). The solution is given in detail only within the body of the article, often towards its end. Another study of macroact structure is Candlin *et al.* (1976), which highlights the different stages normally found in oral texts of doctor-patient interactions during surgery visits. The basic pattern found by the authors consists of four main stages, preceded and followed by two routine opening and closing stages typical of oral interaction, i.e. initial greetings and leave-taking. The first stage is the doctor's request for information on the complaint and the patient's conveyance of such information; the second is the visit itself; the third is the doctor's diagnosis; and the fourth is advice for treatment and follow-up. These four stages have also been investigated by researchers looking at single exchanges within the corpus considered. They have identified not only sentences realising the four aforesaid macrofunctions but also a number of metacommunicative functions linked to the speaker's (generally the doctor's) need to make his communicative intention clear and transparent. Despite the difficulty of assigning a single pragmatic purpose to each interactant (a problem encountered not only in this study but in most attempts to identify textual microacts), the authors have found the following highly-recurring functions in doctor talk to patients during surgery visits:

a. GREET ('Good morning.')
b. ELICIT ('Can you tell me what happened?')
c. INTERROGATE ('Did you bend right back when you fell?')
d. QUESTION ('Does this hurt?')
e. MAKESURE ('It doesn't hurt?')
f. EXTEND ('So it doesn't hurt to put your weight on it?')

g. ACTION-INFORM ('I'm going to put in a couple of stitches.')

h. DIAG-INFORM ('You haven't broken anything.')

i. PROG-INFORM ('It should heal up quite quickly.')

j. TREAT-DIRECT ('Take plenty of rest.')

k. DIRECT ('Can you just lie down a moment.')

l. APOLOGY ('Sorry.')

m. TALK ('Little girls tend to do that sort of thing.')

n. MED-ASK ('Are you allergic to penicillin?')

o. ADMIN-ASK ('Do you use this hand in your work?')

p. REASSURE ('Nothing serious here')

q. ACCEPT ('I see')

r. LEAVETAKE ('See you after the x-ray then.')

s. GO-ON ('Mmm...' To encourage patient to continue the story)

t. ANSWER ('Yes, I'm afraid it's broken just here.')

u. REPEAT ('What?')

v. RESTATE ('...Swallow all right.' Repeating what was said because the patient did not catch it)

w. FEED-ME-BACK ('Do you follow me?')

The combination of various sequences within the corpus is fairly regular: 95% of interactions open with the microact GREET followed in 60% of cases by the microact ELICIT and in 50% of cases by INTERROGATE. The sequence GREET – ELICIT – INTERROGATE (with its associated replies) is therefore considered distinctive of the first stage. A comprehensive investigation of microacts in doctor-patient interaction was carried out by Coulthard and Ashby (1976), who analysed 24 recordings of talk in English surgeries. Their study is part of a wider research project that sought to develop a new linguistic model for the structure of oral discourse in verbal interactions across different social and vocational settings. The theoretical model derived from this project is given in Sinclair and Coulthard (1975), which offers a hierarchical framework for oral interaction based on four levels: TRANSACTION, which in turn comprises several EXCHANGES, divided into MOVES made up of ACTS. Although the hierarchical structure of doctor-patient interactions found by Coulthard and Ashby closely reflects that of oral communication in general, their study highlights a feature that makes it more marked than others: the fact that all interactive moves are driven by the same interactant, i.e. the

doctor. In doctor-patient communication, the doctor is the one who starts every exchange while the patient behaves as a respondent. The value of this study lies in its use of linguistic analysis for evidence of the doctor's dominant role in his relationship with patients – a point made also by psychological and sociological investigations of participants' behaviour in this kind of conversation.

Similar results have been found in analyses of courtroom interactions during legal proceedings. Various studies (among others, Charrow / Charrow 1979; Walker 1982; Philips 1987; Atkinson / Drew 1990) have shed light on the considerable divergences between the standard norms of verbal interaction and its construction in a specialized setting where cross-examination of suspects and witnesses is crucial to the outcome of the trial. The defending lawyer exploits all his linguistic skills to obtain admissions, substantiation, contradictions and other evidence to underpin his reasoning. A crucial factor is the way each question is put, how answers are exploited to support a line of defence (or accusation), how hesitations or flaws are emphasised, witnesses interrupted, topics introduced, main points listed, etc. The great difference between standard interaction vs. legal proceedings and the lawyer's role vs. that of the witness are clearly described in the following quote from Charrow (1982), underlining the inadequacy of common interaction norms in this kind of specialized context:

> Rules for turn-taking are different in courtroom 'conversation' than in ordinary conversation. And even if witnesses are aware of the existence of different rules, they do not usually know what those rules are, and are either penalized or left at a disadvantage. Linguistic theory as it currently stands cannot account for these rules. Nor can it explain the conversational structure when two different sets of rules meet and conflict – as they do when a lawyer and a non-lawyer converse. (Charrow 1982: 99)

Trimble (1985) has developed an analytical model for specialized texts based on four levels. The first of these identifies the main objectives of discourse, equivalent to the text's main pragmatic functions – e.g. reporting an experiment, making suggestions, illustrating a new theory, postulating a new hypothesis and so forth. The second level tends to focus on what Trimble calls "the general rhetorical functions that develop the objectives of [the first level of analysis]". These draw attention to the text's macrofunctions and

inform its rhetorical-conceptual framework. Thus an experimental report is likely to include the following macroacts:

1. Stating purpose;
2. Reporting past research;
3. Stating the problem;
4. Presenting information on apparatus used in an experiment:
   a) Description;
   b) Operation;
5. Presenting information on experimental procedures.

The third analytical level sheds light on the specific rhetorical functions that develop the general rhetorical functions found at the second level. These are the microacts needed to realise each macroact: e.g. the description stage is divided into sub-stages for physical and / or functional and / or procedural description. Finally, this model accounts for the rhetorical devices that enable the development of semantic / pragmatic links within and among the microacts assigned to the third level. Physical description, for instance, relies mainly on spatial rhetorical resources, while functional description relies on causal resources, and procedural description relies chiefly on a time-oriented structure. Various aspects of Trimble's model have been criticised, especially as regards the inaccurate linguistic terminology and merging of terms from different linguistic fields (semantics, pragmatics, morphosyntax, textual analysis and rhetoric) without sufficient consistency. However, this model has helped to identify the different structural levels of specialized discourse and its simplicity has permitted several applications also for pedagogic purposes. Sinclair and Coulthard's (1975) framework is of course far more detailed and sophisticated, but is also harder to apply for practical purposes. Trimble's model, on the other hand, is more user-friendly, if not equally thorough and comprehensive. What is quite difficult to analyse is the link between macroacts and microacts, also because different rhetorical functions (to quote Trimble's term) may be applied at both macro and micro levels. It is not surprising, therefore, that a considerable number of studies on the organisation of specialized texts concentrate on the relationship among microacts and their dependence on certain macroacts, as visualised in various effective diagrams. An

example in this class is Rossini Favretti and Bondi Paganelli's illustration (cf. Figure 6) of the links found in the following passage from a psychology monograph:

(20)   (1) Since the very earliest studies of adolescence, stress has been placed upon the characteristic intellectual development of the period. (2) There is such an increase of mental power that subject matter too difficult for freshmen in high school or in college is easily learned by the same pupils when they become seniors. (3) A high school teacher notes also marked increases in judgement, reasoning, comprehension, and memory. (4) Some of the observed development in mental power comes from neural growth, but part of it is doubtless due to the piling up of experience and knowledge. (5) By the end of the eighth grade a child has accumulated a considerable store of basic information and has reduced many simple skills to such an automatic level that he can use them in his thinking. (6) He has, for instance, acquired meanings for about ten thousand words, and therefore has a vocabulary with which to think. (7) Several mathematical skills are now habitual, many elementary scientific facts have been thoroughly absorbed, and there has been considerable experience with cause and effect relationships. (8) The childhood years may thus represent a gradual development of sufficient experience to serve as a basis for more complicated thinking. (9) In many curves of learning one finds long plateaus covering the periods during which basic skills are being acquired. (10) At the end of such plateaus there is usually a sudden and marked rise in learning rate.

The sequence of macro- and micro-acts generally follows clearly-codified norms which are widely accepted within the discipline, but it may also be governed by inherent semantic-pragmatic requirements leading to natural sequences of the type: cause-effect, condition-consequence, problem-solution, hypothesis-evaluation, experiment-results, etc. The link among speech acts is such that the first item immediately suggests the second. Such semantic-pragmatic structures are not a feature of specialized discourse alone (or of a specific language) but occur universally. However, as seen earlier in this volume, the need for clarity forces specialists to adopt a more 'transparent' type of writing, where linguistic forms are an accurate expression of the text's semantic content but also a clear, unambiguous reflection of its pragmatic values. For this purpose, the writer employs not only the conjunctions and prepositions of standard discourse but also verbs and nouns that replicate the illocutionary dimension on the sentence surface.

OBSERVATION

GENERALIZATION (1)

AMPLIFICATION (2)

ADDITION (3)

ANALYSIS

REASON (4)

AMPLIFICATION (5)

EXEMPLIFICATION (6)   EXEMPLIFICATION (7)

PROBLEM
DEDUCTION

INFERENCE (8)

EVIDENCE (9 + 10)
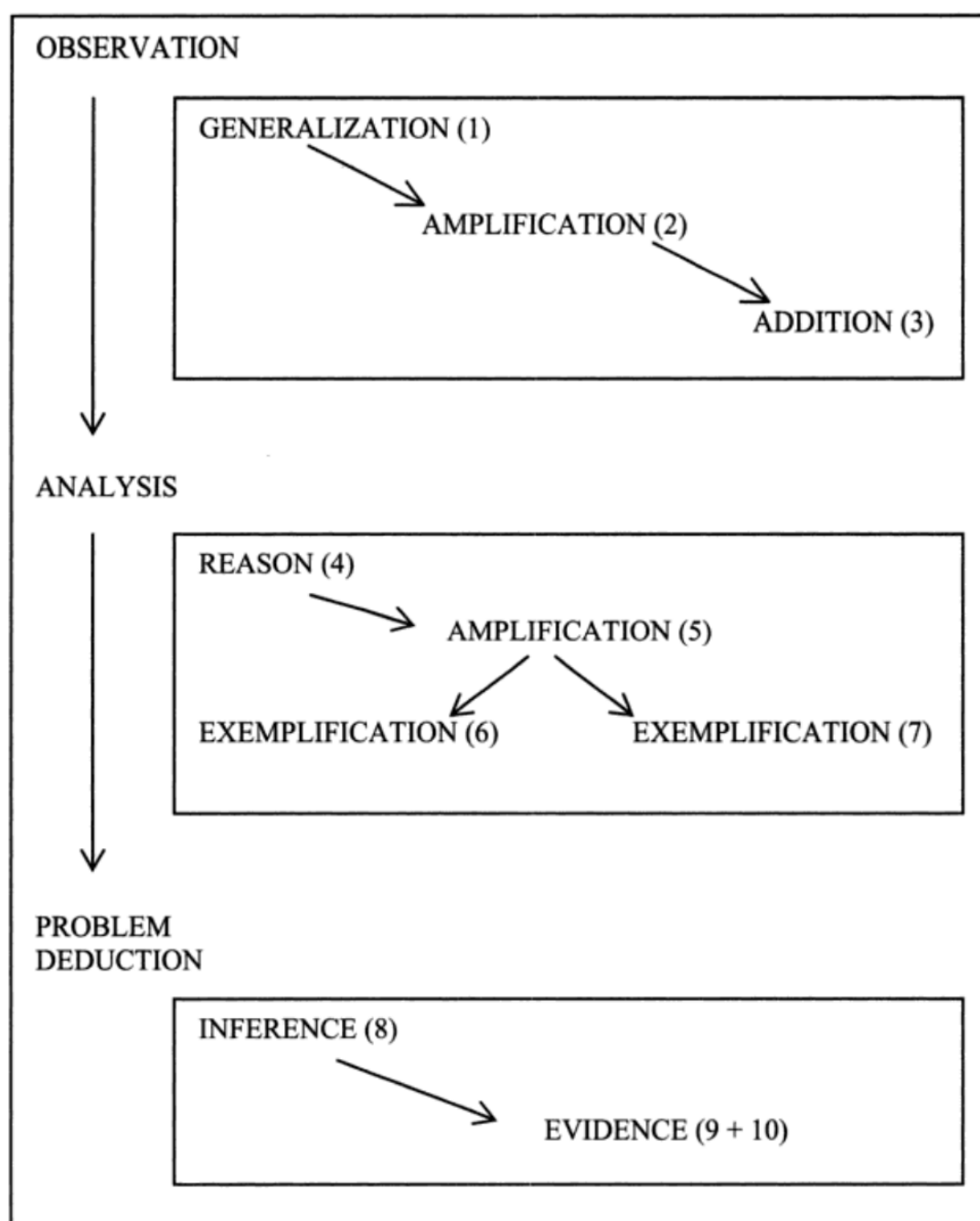
Figure 6. Rossini Favretti and Bondi Paganelli's (1988: 17-18) illustration of the structure of a passage from a psychology monograph.

The different microacts and macroacts in specialized texts – e.g. exemplification, temporal specification, causal links, concession, hypothesis, description, suggestion, conclusion, comparison (analogy / contrast), prediction, analysis, etc. – generally coincide with the pragmatic dimension of general language. In some cases, however, a

given semantic-pragmatic realisation may identify a certain text type. This happens in insurance contracts, where the hypothetical-predictive principle prevails over the macrostructure as a superordinate (van Dijk 1980) of the whole text. The macroact governing an insurance contract may indeed be summarised in a prediction of the type: 'If certain conditions are complied with (if the insured party pays the agreed premium at the right time) and if certain events take place (if the insured property is damaged or stolen, or if the insured person dies), a certain event will occur (the insured party will be compensated or his heirs will receive a given sum)'. This logical-semantic pattern means that English legal texts express ideational content through a surface structure of the following kind (examples from Crystal / Davy 1969):

(21)   If the Life Insured shall pay or cause to be paid to the Society or to the duly authorised Agent or Collector thereof every subsequent premium at the due date thereof the funds of the Society shall on the expiration of the term of years specified in the Schedule hereto or on the previous death of the Life Insured become and be liable to pay to him / her or to his / her personal representative or next-of-kin or assigns as the case may be the sum due and payable hereunder in accordance with the Table of Insurance printed hereon and the terms and conditions of the said Table (including any sum which may have accrued by way of reversionary bonus) subject to any authorised endorsement appearing hereon and to the production of this policy premium receipts and such other evidence of title as may be required

(22)   If upon the death of the life insured there shall be no duly constituted personal representative or nominee or assignee of the Life Insured able and willing to give a valid receipt for the sum payable such sum may in the discretion of the Committee of Management be paid to one or more of the next-of-kin of the Life Insured whose receipt shall effectually discharge the Society from all liability under this policy

Logical-semantic links of the hypothetical type are equally crucial in wills. Here the signatory's decisions are made dependent upon the occurrence of certain events: not only the testator's death but also other occurrences involving the life and death of heirs mentioned in the will, of the type: should X die before Y, if any of my children die before me, if X has no children, etc. In terms of linguistic realisation, the prevalence of this logical-semantic function implies frequent recourse to hypothetical clauses. In his study of the language of wills,

refer to the firm mentioned at the beginning of the contract but to another firm whose name is not given in the contract. Once again, accurate use of terminology and capitalisation stems from the great need for clarity in legal writing, though its widespread use may suggest more practical considerations. This remark stems from the analysis of clauses in documents of the following kind (example taken from Piesse 1987):

(25)   The Conveyance is made the .... between .... of ...... (in this conveyance called 'the Vendor') of the one part and.......... of ...... (in this conveyance called 'the Purchaser') of the other part.

Here the capitalised use of *Vendor* and *Purchaser* (as of *Landlord* and *Tenant* in the first document in the Appendix to this volume) does not single out a specific vendor or purchaser – as the contract mentions no other firms in this class – but it simply allows the drafter to write the names of the contracting parties only once in a pre-printed contract, without having to add their whole name every time.

6. Speech acts

One of the problems confronted by the analyst is how to profile certain speech acts within each part of a text, whether specialized or not.[4] Language often serves different purposes, as the author employs the text to achieve various results simultaneously. Any attempt to assign a single illocutionary meaning to a text (or its separate parts) is therefore an unacceptable simplification. The range of speech acts based on Austin's (1962) and Searle's (1969) taxonomies is similar in specialized and non-specialized texts. However, there is one class (performatives) that occurs far more frequently in legal texts. Here the wording of text is crucial, as the use or insertion of a given expression

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4   On the analysis of speech acts in specialized texts cf., among others, Bowers (1989), Danet / Hoffman / Kermish (1980), Garzone (1996, 2001), Kurzon (1986), Solan (1993), Stotesbury (2002), Tiersma (1986, 1999).

may alter the act's value. Accordingly, the value of a legal act often hinges on the use of a specific formula. A will, for example, is valid only if it contains the phrase *I bequeath*, while a wedding's validity requires the formula *I pronounce you husband and wife*. The observation that performatives are closely associated with legal discourse is also confirmed by Austin's choice of the adjective *operative* (typical of lawyers' jargon) as the best synonym for his own term *performative*:

> Lawyers when talking about legal instruments will distinguish between the preamble, which recites the circumstances in which a transaction is effected, and on the other hand the operative part – the part of it which actually performs the legal act which it is the purpose of the instrument to perform. (Austin 1962: 236)

Language in the law is probably more performative than in any other field (cf. Kurzon 1986). Indeed, the mere statement of guilt or innocence pronounced by a judge makes the culprit guilty (or not guilty) of a crime, whether or not he actually committed it. Similarly, a court can declare legally 'deceased' a person who has been missing for a long time, even if that person may have moved to another country or changed his identity and threfore is not, physically speaking, dead. Charrow explains the value of performatives in legal language in these terms:

> Many legal pronouncements are *performatives*: [...] written or spoken words within the correct context are used to create contracts – performance obligations – between people. A marriage license – a written legal formula – and certain oral pronouncements made with the proper legal authority join two people in marriage. If a legal notice is published where a fairly large number of people can be assumed to see it, there is, in certain circumstances, a presumption under the law that all people have been notified. This is despite the fact that most people do not read legal notices, and probably would not understand them if they did read them. (Charrow 1982: 97-98)

The importance of speech acts with a performative orientation – with a first-person singular pronoun and a conventional formula making the act legally valid – is confirmed by the following transcription of questioning in the courtroom, where the accused admits guilt (*I did it*)

but only pleads guilty from a legal point of view at a later stage (*Guilty*):

(26)   CLERK: Do you plead guilty or not guilty?
       DEFENDANT: Yes, I did it. I said I did it.
       CLERK: No. Do you plead guilty or not guilty?
       DEFENDANT: Yes, I did it. I just want to get it over.
       MAGISTRATE (to probation officer): Can you be of help here?
       The probation officer goes over to the defendant and eventually goes out of court with her. Later in the morning the case is 'called on' again.
       MAGISTRATE: Do you plead guilty or not guilty?
       DEFENDANT: Yes, I did it.
       MAGISTRATE: No, I'm asking you whether you plead guilty or not guilty. You must use either the words 'not guilty' or 'guilty'.
       DEFENDANT: (Looking toward probation officer) She said, "Say guilty."
       MAGISTRATE: No. You must say what you *want* to say.
       DEFENDANT: Yes, I'll say what you like. I did it.
       MAGISTRATE: No, you must use the language of the court. (To probation officer) Did she understand?
       PROBATION OFFICER: Yes, she understood.
       The probation officer once more approaches the dock, whispers to the woman and the word 'guilty' emerges. (Carlen 1976: 110-111, quoted in Danet 1980: 460-461)

7. Argumentative pattern

The highly-structured construction of specialized discourse is reflected also in its argumentative pattern. As the main purpose is to convince readers that the author's perspective is the right one, argumentation (but also clarity and logical coherence in the presentation of evidence) proceeds in a straight line to achieve the perlocutionary effect inherent in this type of text. For this reason, text is organised according to a 'compositional plan' (Werlich 1976) carefully designed to serve a given thesis. Though this plan is not identical in all argumentative specialized texts – because it depends on the thesis considered, on the specialist's heuristic method, his epistemological principles and personal style – there is an overall pattern underlying most texts (cf. Toulmin 1958). In this sense, a

This structure comprises various stages: after analysing previous literature and / or observing data (D), the author identifies the problem (P) and suggests a viable solution (S). Through logical argumentation (A) supported by adequate proof (W), he reaches a conclusion (C) and affirms it with a certain degree of certainty. Although common to many types of specialized and non-specialized texts, this model allows for a degree of subjectivity when the author attributes certainty to his conclusions. Even in the hard sciences and in objective demonstrations, the role of evidence brought in favour of a given claim depends largely on the use of language. As Swales (1986) aptly observes:

> It is sometimes thought that the facts 'speak for themselves' – that a scientist's description of natural reality, if it is carefully and completely done, is simply a reflection of that reality. If this were to be the case, then Boyle's complex strategy would not have been necessary. Facts are constructed. Phenomena only acquire fact-like status by consensus and that consensus is only achieved by rhetorical persuasion. The art of the matter, as far as the creation of facts is concerned, lies in deceiving the reader into thinking that there is no rhetoric, that research reporting is indeed 'writing degree zero' and that the facts are indeed speaking for themselves. (Swales 1986: 17)

Given the highly persuasive value of language, authors use their linguistic skills with great care and strategic competence to create consensus around their claims, taking up positions and expressing judgements through a range of rhetorical and linguistic resources, variously called 'appraisal' (Martin 1997), 'evaluation' (Hunston / Thompson 2000) or 'stance' (Hyland 1999). One way to add value to a thesis is to weaken alternative options: that is why authors often refer critically to previous studies. The very notion of argumentation means that an author should offer new insights that contradict earlier opinions. These are generally presented in a *pro-aut-contra* (Naess 1966) rather than *pro-et-contra* progression, as the author does not merely list diverging viewpoints but steers the reader towards his own conclusions. Alternative claims are therefore presented in such a way that their logical inconsistency, inaccuracy or incompleteness are

to the subject have been unsatisfactory, he usually points out where the problem lies, and then puts forward his claim. In order to emphasize his commitment to the search for a suitable solution to the problem, the author often makes use of deontic modal verbs such as *shall*, *will* or *would*:

(31)   I would like here to raise the question of whether there might not be biological endowments in man that make the human form of communication uniquely possible for our species.

(32)   We will maintain that there has been a fundamental misunderstanding of how in this respect the economy in which we live actually works.

If personal or passive forms rather than active ones are used, the style is kept personal by the use of the possessive adjectives *my* and *our*:

(33)   This will be our contention: ...

(34)   Our theory can be summed up in the following propositions.

(35)   The outline of our theory can be expressed as follows: ...

In dealing with a topic in a new and original way, the author often needs to invent new terms or redefine existing ones. As seen above, operations that imply a creative role on the part of the author are usually denoted by the use of deontic modality.[6] The modals commonly employed to carry out this metalinguistic function are *must*, *should*, *ought*, *shall* and *will*:

(36)   We must now define the third category of unemployment.

(37)   Disutility must be here understood to cover every kind of reason which ...

(38)   Nor should we regard as 'involuntary' unemployment the withdrawal of labour ...

(39)   Such unemployment ought to be included under the above category of 'voluntary unemployment'.

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6   On the use of modality in specialized argumentation cf., among others, Gotti / Dossena (2001), Hunston (1994b), Hyland (1998, 2002), Varttala (2002), Vihla (1999).

instructions and reach the same conclusions that he has come to, the skilful writer does not use the type of modality commonly employed to place somebody under an obligation, that is, deontic modality, as this would produce the opposite effect. The mastery of the writer, on the contrary, is shown by his adoption of a more neutral tone and the use of less subject-oriented modality such as dynamic (Palmer 1979 / 1990) or epistemic. In this way he gives the impression that his conclusions are not imposed on the reader, but rather that they are logically drawn from the evidence produced or the argumentative strands presented. The two modals principally used to persuade the reader to take this 'mental leap' (Brockriede 1975) from facts to conclusion are *can* and *must*:

(49)   Only at this point can there be stable equilibrium.

(50)   This level cannot be greater than full employment.

(51)   If employment increases, then, in the short period, the reward per unit in terms
        of wage-goods must, in general, decline and profits increase.

In this way, the author is not stating conclusions which might be perceived as presumable or probable, but as inferential statements adequately warranted by evidence. The argumentative process consists therefore of a process of reduction of uncertainty which can be summed up in the following two continua of modality:

PROBABILITY – POSSIBILITY – POSITIVE CERTAINTY

IMPROBABILITY – IMPOSSIBILITY – NEGATIVE CERTAINTY

The author's main aim is thus to demonstrate that by means of his argumentation, POSSIBLE (P) becomes NECESSARY (P) or – to use Leech and Coates's formula for the law of inverseness of possibility and necessity (1979: 80) – NOT (POSSIBLE P) becomes NECESSARY (NOT P). The choice of *must* and *can't* to reproduce the persuasive effect involved in the argumentative function is not casual, as their strong epistemic value is only a gradient on their meaning continuum which also includes strong deontic modality. The gradience of the modals selected enables the writer to charge the original semantic

value of his statement 'It is necessarily the case that P / not P' with the illocutionary value 'It is necessary for you to accept P / not P'.

8. Linear structure and heuristic methods

The analysis of specialized texts points to the presence of a close link between the author's language and his heuristic method. This relationship surfaces especially in the text's drafting plan, which is organised according to the discipline's theoretical foundations. Thus different methodological orientations (e.g. inductive rather than deductive reasoning) are necessarily reflected in considerably different text forms. At times the close link between method and composition creates major difficulties for authors, especially when the drafting pattern clashes with the non-sequential nature of theoretical argumentation. An example of this conflictual situation can be found in *The General Theory*, whose method is very different from the one prevalent at the time when it was written and considered inadequate by Keynes. His analytic model, instead, is based on the notion that there is an organic interdependence among economic variables, and in this way it aims to overcome the limits of the atomistic approach which had been characteristic of the classical theory. Keynes himself explains the systematic nature of the new analytic method at the point in *The General Theory* at which he clarifies what the new methodology amounts to:

(52)   The object of our analysis is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organised and orderly method of thinking out particular problems; and, after we have reached a provisional conclusion, by isolating the complicating factors one by one, we then have to go back on ourselves and allow, as well as we can, for the probable interactions of the factors amongst themselves. (Keynes 1936 / 1973: 297)

Keynes' heuristic method thus sets itself to overcome the restricted nature of the classical approach by dealing with two opposing needs. On the one hand, there is the need to examine the various economic

variables as isolated elements. On the other, there is the need to bring these independent studies together and to show the close interrelations among the various variables examined. This alternation between linear atomistic analyses and complex systemic integration is reflected at the level of the expository form of the book. At that level, we find recurrent references back and forth to other parts of the book. Chick's simile compares this technique to the expository language of cinema:

> Keynes's method is more like a film, a moving picture, made from snapshots (as films are), each snapshot systematically related to what has gone before. It is a story full of flashbacks – and flashes forward. (Chick 1983: 14)

Keynes uses this continual referring of the reader to other parts of the book as a compromise between, on the one hand, the complexity and systemic interdependence of the parts of his analysis and, on the other, the linearity of the lay-out of the book as written. We can see how this compromise operates in *The General Theory* with a few quotations in which Keynes moves away from the text in order to help the reader to grasp the overall scheme of the book. What he provides are indications that different aspects of a given economic problem have to be discussed in different chapters:

(53)   The theory of wages in relation to employment, to which we are here leading up, cannot be fully elucidated, however, until chapter 19 and its Appendix have been reached. (Keynes 1936 / 1973: 18)

(54)   We shall return to the aggregate supply function in chapter 20, where we discuss its inverse under the name of the *employment function*. But in the main, it is the part played by the aggregate demand function which has been overlooked; and it is to the aggregate demand function that we shall devote Books III and IV. (Keynes 1936 / 1973: 89)

(55)   It may be mentioned, in passing, that the effect of fiscal policy on the growth of wealth has been the subject of an important misunderstanding which, however, we cannot discuss adequately without the assistance of the theory of the rate of interest to be given in Book IV. (Keynes 1936 / 1973: 95)

(56)   Only at the conclusion of Book IV will it be possible to take a comprehensive view of the factors determining the rate of investment in their actual complexity. (Keynes 1936 / 1973: 137)

In other parts of the book, before launching into the analyisis of the elements of a given theory, Keynes gives a summary sketch of it, even though he is aware that the reader will have some difficulty in understanding the novel theory before it has been presented in full and its terminology explained:

(57) A brief summary of the theory of employment to be worked out in the course of the following chapters may, perhaps, help the reader at this stage, even though it may not be fully intelligible. The terms involved will be more carefully defined in due course. (Keynes 1936 / 1973: 27)

On occasion he has to break up the discussion of some economic variables, leaving the exposition suspended, in order to introduce further explanations which the reader might consider as mere digressions:

(58) In this and the next three chapters we shall be occupied with an attempt to clear up certain perplexities which have no peculiar or exclusive relevance to the problems which it is our special purpose to examine. Thus these chapters are in the nature of a digression, which will prevent us for a time from pursuing our main theme. (Keynes 1936 / 1973: 37)

Sometimes the clarifications appear one after the other and produce the appearance of digressions on digressions. For instance, as we have seen in the previous quoted passage, Chapters 4-6 are counted as a digressions to which is added an appendix which itself serves as a digression:

(59) User cost has, I think, an inportance for the classical theory of value which has been overlooked. There is more to be said about it than would be relevant or appropriate in this place. But, as a digression, we will examine it somewhat further in this appendix. (Keynes 1936 / 1973: 66)

Occasionally Keynes finds himself unable to sustain the discussion of some issues and has to introduce some aspects or terminology without being able to clarify them adequately:

(60) In some passages of this section we have tacitly anticipated ideas which will be introduced in Book IV. (Keynes 1936 / 1973: 112)

9. The emotive force of specialized texts

As seen above, one remarkable feature of specialized discourse is the great referential value of texts and the limited emotional involvement of their receivers (cf. Chapter 2). The following citation from Barrass (1978), for example, clearly emphasises the objectivity of specialized discourse:

> The novelist, journalist or advertizer, to drive home a point, may repeat, exaggerate or understate his case. None of these techniques is available to the scientist who must tread a more difficult road and convince readers by evidence, relying on the truth clearly stated and on the logic of the argument. (Barrass 1978: 31)

Theoretical validity and the evidential weight of observations are considered sufficient to confirm the value of an author's claims, whereas any emotive content is carefully removed. As Walton explains:

> Traditionally, appeals to emotion in argument have been distrusted and even labeled categorically as logical fallacies. There is a common tendency to contrast 'impartial reason' with 'the passions' and to distrust the latter in reasoned argument. And this tendency is often affirmed in logic texts where appeals to emotion have been treated as inherently illogical and subject to strong censure. (Walton 1989: 82-83)

This assumption has been normally complied with for over four centuries – that is, since modern science pitted itself against Aristotelian rhetoric, making a clear distinction between 'conceptual rhetoric' and 'persuasive rhetoric' (Frye 1957), in line with the division between intellect and emotion. In recent years, however, especially in the wake of Perelman and Olbrechts-Tyteca's (1958) research, the persuasive element of argumentation, also in specialized discourse, has been reconsidered. Its aim therefore is to convince the audience not only through sound demonstration and experimental evidence but also through plausible, persuasive argumentation that is not necessarily irrefutable. For this purpose, authors deploy every device available in specialized discourse, including figurative and

emotive language which is normally considered alien to the epistemology of specialized texts. To exemplify the use of emotional elements in specialized argumentation we shall refer once again to Kenyes' text. Indeed, when reading *The General Theory* one immediately perceives that the conflictual element implicit in all argumentative texts is here taken to extremes.[7] This impression is confirmed by the reading of Keynes' correspondence with colleagues and friends, which is a useful insight on his determined intention to highlight the conflictual aspects of this book. In fact, in replying to Ralph F. Harrod, he writes:

> I want, so to speak, to raise a dust; because it is only out of the controversy that will arise that what I am saying will get understood. (Keynes 1936 / 1973: XIII, 548)

Keynes' decision to adopt this very conflictual standpoint is coherently maintained in the style he chooses for his writing, and is reflected in the very harsh and polemic tone which characterizes his use of words and figures of speech, especially in the preface to the work and in Chapter 12. The extremely emotive language employed has an immediate impact on the reader, who would expect to find the usual referential tone typical of specialized discourse rather than an emotional tone which, according to Jakobson (1960), is more pertinent to literary works. The choice of lexis in Keynes' text, in fact, demonstrates the author's ability in using the linguistic code to criticize the existsing economic theory and present his new ideas in an extremely figurative and connotative language. From Keynes' use of words, the reader realizes that the author conceives his work as a reaction against the current theory, as "a long struggle of escape from habitual modes of thought and expression." (Keynes 1936 / 1973: xxiii). He has reached a state of freedom from the preconceived doctrines of the past, and is now feeling himself "to be breaking away from this orthodoxy, to be in strong reaction against it, to be escaping from something, to be gaining emancipation." (Keynes 1936 / 1973: xxiii). He wants to make a clean break with the past, as he considers

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7   On the analysis of conflictual aspects in argumentative discourse cf., among others, Gotti *et al.* (2002), Hunston (1993b), Salager-Meyer (2000), Salager-Meyer / Zambrano (2001).

the theory prevalent among academics to have proved "misleading and disastrous" (Keynes 1936 / 1973: 3). The language of struggle and conflict is often used by Keynes, not only to express his controversies with fellow economists, but also to describe the divergences of opinion among other economists. Here are, for example, some of the statements used by Keynes to express the difference in viewpoint of Malthus and Ricardo:

(62)   Malthus, indeed, had vehemently opposed Ricardo's doctrine [..]. Ricardo conquered England as completely as the Holy Inquisition conquered Spain. [...] The other point of view completely disappeared. [...] The great puzzle of effective demand with which Malthus had wrestled vanished from economic literature. [...] It could only live on furtively, below the surface, in the underworlds of Karl Marx, Silvio Gesell or Major Douglas. The completeness of the Ricardian victory is something of a curiosity and a mystery. (Keynes 1936 / 1973: 32)

Keynes' mastery in the use of language is also shown by the ability with which he employs different tones to criticize his opponents. In fact, even though he usually prefers to choose a direct way of attacking them, he sometimes adopts a less straightforward method and recurs to irony as his weapon, as the following example shows:[8]

(63)   The classical theorists resemble Euclidean geometers in a non-Euclidean world who, discovering that in experience straight lines apparently often meet, rebuke their lines for not keeping straight as the only remedy for the unfortunate collisions which are occurring. (Keynes 1936 / 1973: 16)

Chapter 12 shows particular emphasis on the emotional tone of Keynes' style. The aim of this chapter is to convince its readers of the unreliability of economic decisions concerning investments due to the high level of irrationality in investors' behaviour. To underline this irrational attitude, rather than adopting a logical way of reasoning, Keynes prefers to argue "on a different level of abstraction from most of the book" (Keynes 1936 / 1973: 149). In particular, Keynes decides

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8   The importance of the use of irony in argumentative discourse has been highlighted by Werlich: "Ironical style is frequent as a concise form of argumentation which attempts quick persuasion by ridicule instead of developed arguments." (Werlich 1982: 273)

to adopt lexical items which have a strong emotional load generally indicating excess in the presence or absence of certain semantic traits. The most frequent semantic fields to which such degree of excess is usually applied are reasonableness *(foolish, unreasoning, vagaries, irrational),* quantity *(disproportionately, outstanding, extreme, negligible, scanty, slight, non-significant),* size *(extensive, enormous, vast),* norm *(abnormal, anti-social),* gravity *(disastrous, collapse, serious)* and force *(violently, prevailing, predominates, predominance).* The markedness of Keynes' text is also denoted by the 'unnatural' semantic fields from which lots of lexical items are taken, which are far removed from the semantic areas commonly associated with the economic discipline and are therefore likely to arouse emotion in the readers. Some of these 'unnnatural' semantic fields found in Chapter 12 are religion *(temptation, orthodox, fetish, doctrine, faith, sins),* physical elements *(sanguine, instinct, animal spirits)* and war *(gun, battle, assailed).* Even where lexical items do not denote excess or unnaturalness, they are often made more marked by the use of intensifying and attitudinal premodifiers which emphasize the semantic traits expressed by them or add a comment on them. The commonest of such pre-modifying expressions found in our text are: *decisively, very, highly, most, seriously, much more, intolerably, over-, entirely* and *scarcely.* On other occasions the author emphasizes the degree of validity of his assertions by means of attitudinal adverbials such as *obviously, surely, indeed, of course, frankly* and *in truth.*

Apart from the linguistic items examined above, Keynes makes use of various rhetorical devices to emphasize the emotional tone of his text. One of such means is reinforcement. In several cases, in fact, Keynes chooses to emphasize the semantic load of a lexical item by adding a synonym or a term related to it. Examples include: v*ague and scanty, very slight and often negligible, ephemeral and non-significant, intolerably boring and over-exacting, inaccessible and very expensive, permanent and indissoluble, supplemented and supported.* Sometimes the succession of items is lengthened, with the addition of a third element which has the function of increasing the effect of the whole series: *eccentric, unconventional and rash; disastrous, cumulative and far-reaching repercussions.* The succession of elements is often seen not as a mere reception of the concept

expressed by the first element, but as a boosting of its semantic value in a sort of crescendo:

(64)   We have to admit that our basis of knowledge for estimating the yield ten years hence of a railway [...] amounts to little and sometimes to nothing. (Keynes 1936 / 1973: 149-150)

(65)   Day-to-day fluctuations in the profits of existing investments [...] tend to have an altogether, and even an absurd, influence on the market. (Keynes 1936 / 1973: 153-154)

(66)   Thus if the animal spirits are dimmed and the spontaneous optimism falters [...] enterprise will fade and die. (Keynes 1936 / 1973: 162)

Another rhetorical device often used by Keynes to highlight the emotional tone of his discourse is contrast. The whole chapter, in fact, is built around a series of contrasts which emphasize the great discrepancy between the common view of rational expectations connected to investments and the irrational choices made by investors in reality. By reporting the linguistic items which express the main contrasts pointed out in the chapter, we can show the progress of Keynes' argumentation, and in particular highlight his point of view concerning long-term investments in the second column of the list here below:

(67)   existing facts   future events
        reasonable   foolish
        cold calculation   take a chance
        fixed investments   liquid investments
        revival   collapse
        strengthening   weakening
        enterprise   speculation
        mathematical expectation   spontaneous optimism
        action   inaction

A further rhetorical device used by Keynes to make the tone of his argumentative text more emotional is metaphor.[9] Indeed, the author

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9   The strong emotional load favoured by the use of metaphoric language is pointed out by MacCormac: "I argue that metaphor results from a cognitive process that juxtaposes two or more not normally associated referents,

very often prefers to convey a certain concept by means of a figure of speech so as to make the idea he is expressing more striking. What creates the emotional effect is once again the use of items taken from fields not directly connected to the economic discipline; these fields moreover are chosen among the ones which bear strong connotations and are therefore very likely to arouse an emotional response in the reader. The following, are the commonest semantic fields from which Keynes builds his metaphors: religion *(the fetish of liquidity, the sins of the London Stock Exchange)*, war *(dark forces of time and ignorance which envelop our future, this battle of wits, to defeat the forces of time)*, corporal states *(to feed the maws of the professional, gambling instinct)*, natural states *(a steady stream of enterprise, a whirlpool of speculation)* and playing games *(businessmen play a mixed game, the game of professional investment, gambling instinct)*. The latter semantic field of playing games is certainly the one most frequently employed by Keynes, as it enables him to convey his argument in the most convincing way. Indeed, on deciding to base his persuasive strategy on an emotional level rather than on a rational one Keynes selects the analogy INVESTMENT = GAME as the best one to represent in the most immediate and striking way the irrationality and unpredictability of long-term investments

10. The literary value of specialized texts

As pointed out earlier in this chapter, most specialists concentrate on subject content rather than linguistic form when they sit down to write a monograph or another text type. Yet many authors are aware of the close relationship between these two dimensions and carefully adjust the form to enhance perlocutionary meaning. They often employ special rhetorical and linguistic devices (such as those illustrated previously), which are deployed for utilitarian reasons in view of the text's persuasive purpose. Aesthetic considerations are not a priority

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producing semantic conceptual anomaly, the symptom of which is usually emotional tension" (MacCormac 1985: 5).

in specialized discourse as they are in literary texts. Some scholars have indeed looked at the aesthetic value of specialized texts, but the term is used out of context and applied to functional rather than aesthetic features. One example is Weinrich's (1985) inclusion among aesthetic values of such properties as 'clarity', 'lack of contradiction' and 'coherence', which are in fact typical of specialized discourse. Weinrich's stance may not be entirely acceptable but it has raised a debate on an open issue that scholars in different disciplines have not yet properly investigated. The first example offered to support his claim – Watson and Crick's article in *Nature*, announcing their discovery of the structure of DNA – reaffirms Weinrich's highly-subjective application of the term *aesthetic* to functional features which are typical of specialized texts and generally regarded as absent in literary texts. Weinrich argues that the conciseness and richness of this text is conveyed in a linguistic form so 'classic' that it could be included in an aesthetic handbook for science writers, not only because of its revolutionary content but also for its terse presentation. The features identified by Weinrich (a concise text similar to a communiqué with argumentative and mildly critical additions) clearly make this article a model in its class but add no aesthetic value to Watson and Crick's text.

Weinrich's second example in support of his claim that scientific 'style' has an aesthetic dimension, is a volume published a few years after the *Nature* article, in which Watson describes the discovery made with Crick through a narrative interspersed with illustrations and anecdotes. Weinrich extols the interesting literary features of this book, which include the use of a style in keeping with all the rules of narrative art. However, these narrative features make Watson's book closer to a popularisation (which accounts for criticism from peers claiming that the volume is written in an excessively informal tone) or to an autobiographical work (which accounts for the volume's stylistic achievements). It is not appropriate, therefore, to assign aesthetic value to specialized texts because such values are not a priority for authors in the scientific community – which does not mean, of course, that all specialized texts inherently lack literary value, but this is an exception rather than the rule. When it occurs, the author is generally a person of uncommon linguistic sensitivity with

> illustration of the appalling state of scholasticism into which the minds of so many economists have got which allow them to take leave of their intuitions altogether. Yet in writing economics one is not writing either a mathematical proof or a legal document. One is trying to arouse and appeal to the reader's intuitions; and, if he has worked himself into a state when he has none, one is helpless. (Quoted in Patinkin / Leith 1977: 128)

Once more, Keynes stresses the literariness of economic writing and its clear difference from mathematics. Keynes' views on terminology are certainly in line with, and even follow from, the other theoretical and methodological novelties of *The General Theory*, and are themselves in some measure innovative. Also the ambiguity of a few passages of this book is not due to accidental or secondary factors such as haste, insufficient planning or negligent revision, but to a precise choice made by the author himself. Keynes meant his book to be an 'open work' (Eco 1989) as *The General Theory* outlines the main themes of a new theory without preventing the reader from intervening actively in interpreting it and bringing the author's creation to fruition. Its final form was meant to be elastic, capable of being read in a variety of ways, and open to the critical and interpretative agency of the reader. A year after publication, Keynes offered the following comment which supports what we have stated:

> I am more attached to the comparatively simple fundamental ideas which underlie my theory than to the particular forms in which I have embodied them, and I have no desire that the latter should be crystallised at the present stage of the debate. If the simple basic ideas can become familiar and acceptable, time and experience and the collaboration of a number of minds will discover the best way of expressing them. (Keynes 1936 / 1973: XIV, 111)

The General Theory thus represents one of the few non-literary texts in which the author, willingly and knowingly, assigns to the reader not merely the role of decoding the text and assenting to the views propounded, but an altogether more demanding and important role as the author's collaborator in the working out of the final form and the exact meaning of the new economic theory.

Changing Conventions

Even those scientists who intended to use verbal language in the expression of scientific phenomena often pointed out its deficiencies and inaccuracies. Bacon, for example, criticized the fact that in the scientific tradition based on the Aristotelian method the use of language was usually detached from the physical reality to which it referred. In his opinion the terms used in that tradition were not correct, as they referred to 'divisions of nature' which were not tested by any reference to reality, so that the discussions of the learned often ended up in disputes about words and names (the 'Idols of the Market Place') often referring to fictitious entities such as 'Fortune', 'the Prime Mover', etc. An example provided by Bacon of a confused or ill-defined term is *humid*, which he saw as corresponding to:

> Nothing else than a mark loosely and confusedly applied to denote a variety of actions which will not bear to be reduced to any constant meaning for it both signifies that which easily spreads itself around any other body; and that which in itself is indeterminate and cannot solidise; and that which readily yields in every direction; and that which easily divides and scatters itself; and that which easily unites and collects itself; and that which readily flows and is put in motion; and that which readily clings to another body and wets it; and that which is easily reduced to a liquid, or being solid easily melts. Accordingly, when you come to apply the word, if you take it in one sense, flame is humid; if in another, air is not humid; if in another, fine dust is humid; if another, glass is humid. So that it is easy to see that the notion is taken by abstraction only from water and common and ordinary liquids, without any due verification. (Bacon 1620 / 1968: IV, 61)

Bacon maintained, instead, that terms should correspond to data collected and reality observed, this being the only valid basis for the establishment of the laws of nature. There should be a strict relationship between the observational process and its representation, and a direct link should be established between reality observed and verbal expression. In this relationship, however, priority must be given to reality over language, and not vice versa. Elaborating on this concept, John Webster writes:

> Words are but the making forth of those notions that we have of things, and ought to be subjected to things, and not things to words: if our notions do not agree with the things themselves, then we have received false Idola or images of them. (Webster 1677: 21)

Another criticism often made by scientists was the polysemy characterising most words in any language, which often made texts ambiguous. The new scientists could not tolerate the uncertainty of meaning inherent in existing words and condemned all those who did not use language in an accurate way. Robert Boyle, for example, attacked alchemists for the "intolerable ambiguity" and the "unreasonable liberty" with which they used the same term to refer to different concepts, or for their misleading habit of giving "one thing, many names" (Boyle 1661 / 1967: 113). The conclusion he came to was that "this equivocal way of writing was not to be endured" (Boyle 1661 / 1967: 115). The remedy that he suggested consisted in the coining of new terms providing a stricter delimitation of meaning:

> And I confess I could heartily wish, that philosophers, and other learned men (whom the rest in time would follow) would by common (though perhaps tacit) consent, introduce some more significant and less ambiguous terms and expressions in the room of the too licenciously abused word *nature*, and the forms of speech, that depend upon it. (Boyle 1772 / 1965: V, 168)

Apart from these considerations on either the unsuitability of verbal code to express complex scientific phenomena or its inaccuracy and ambiguity – considerations which are valid for all languages – specific accusations were made against the English language, the first being its inadequacy for scientific purposes due to its 'imperfection'. Walter Charleton was one of several who accused the English language of imperfection:

> If my Stile shall sound somewhat harsh and ungrateful many times to Ears unaccustomed to any but their Mother tongue, as coming too near to the Latin; I intreat you to consider, this is either no indecency in this place, or such a one at worst, which I could not otherwise avoid, than by involving my sense in the obscurity of words less proper and significant; the nature and quality of Subjects treated of, being such, as cannot be fully expressed in our yet imperfect Language. (Charleton 1680, Sig. E3v)

Such inadequacy was mainly due to the limited amount of vocabulary present in the language. As Ralph Lever clearly pointed out, there were "moe things, then there [were] words to expresse things by" (*The Arte of Reason* 1573; quoted in Jones 1953: 69). Similarly, in his *Two Treatises* (1644), Sir Kenelm Digby pointed out the limitations of the

English language and the difficulties he had encountered in using it to present scientific discourse. He wrote:

> The scarcity of our language is such, in subjects removed from ordinary Conversation (though in others, I think none is more copious) as affordeth us not apt words of our own to expresse significantly such notions as I must busy myself in this discourse. (Quoted in Vickers 1985: 30).

The field in which the English language proved to be particularly inadequate was that of 'names of art', that is, of the technical terms which made up the basic lexis of a subject. In the preface to John Dolman's translation of Cicero's *Those fyue Questions ... Tusculanum* (1561), for example, we find a complaint about the difficulties experienced in using the native tongue to deal with "such thinges as the Lodgicians terme names of arte, for the whych, we haue no proper Englyse words" (quoted in Jones 1953: 71 n.6). This lack of specialized terms often made the translation of works into English an arduous task, or made it difficult for English scientists to write essays in their native tongue. In the following quotation, for example, Robert Recorde points out the difficulties encountered in choosing to write in his native tongue:

> But now as touchyng myne entent in writyng this treatise in the english. Though this cause might seme sufficient to satisfy many men that I am an englysh man, and therefore may more easely and plainly write in my natyue tonge, rather then in any other: yet vnto them that know the hardness of the mater, this answer shuld seme vnlykely: considering that it is more harder to translate into such a tonge, wherein the arte hath not ben written before, then to write in those tongues that are accustomed, and (as I might say) acquainted with the termes of the science." (Recorde 1547; quoted in Jones 1953: 73)

1. Developments in the lexis of scientific English

The realisation that the English language was inadequate for the needs of expression of men of science led to its gradual amelioration, both from a quantitative and a qualitative point of view. British scientists made great efforts to increase the number of specialized terms and to

improve the exactness of their meanings. Two main principles were followed in coining new terms: that of using the resources of the native tongue, either to give a specialized meaning to an existing word or to form a new one, or borrowing a similar term from a foreign language. 17th century writers were clearly aware of this choice, as the following quotation from Richard Mulcaster's *The First Part of the Elementarie* shows:

> For when the minde is fraught with matter to deliuer, it is still in pain vntill it haue deliuered, and therefor to haue the deliuerie such, as maie discharge the thing well, and content all parties, both by whom and to whom the matter is deliuered, it seeketh both home helps, where theie be sufficient, and significant, and where the own home yeildeth nothing at all, or not pithie enough, it craueth help of that tung, from whence it receiued the matter of deliuerie. (Quoted in Jones 1953: 70 n.1)

In defining a new concept, the specialist sometimes employed a word already existing in the language, adding a specialized meaning to its usual one(s). This is the case, for example, of Newton's use of the word *gravity*, which – as a consequence of his important innovations in the field of physics – took on a new meaning; this new use of the word gave rise to the creation of others strictly connected to it such as *gravitate* and *gravitation*. Another example is the word *machine*, which already existed with the meaning of scheme or intrigue, and which began to be used to refer to a mechanical device concerned with changing the magnitude and direction of forces or forms of energy.

However, the most frequently adopted strategy was the borrowing of terms from other languages, particularly from Latin.[1] The choice of a loan, rather than the specialization of an existing word or the coinage of a new term, was often suggested by the fact that the concept to be referred to was already expressed in a foreign language. The availability of a term was particularly evident in the case of translation of texts. In that case, when the translator came across a word with no equivalent in the tongue into which he was translating, he was obliged to use the original word, thus enriching the lexical load

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[1] As Barber's analysis has pointed out (1976: 166-195), a great number of the new words that became part of the language in the 17th century was made up of Latin loan-words, with a considerable proportion belonging to specialized fields of discourse. This is confirmed by McDermott (2002: 216-218).

of the receiving language. This practice is confirmed by the following statement expressed in the Preface to the Rheims-Douai Bible (1609):

> For necessitie, English not hauing a name, or sufficient terme, we either kepe the word, as we find it, or only turne it to our English termination, because it would otherwise require manie wordes in English, to signifie one word of an other tongue. (Quoted in Tucker 1961: 26)

In adopting the loan, the translator usually adapted the word that he was borrowing to the morphological features of the receiving language, following the conventions in use concerning word-formation. Thus, for example, Latin words ending in *-atio* were provided with the suffix *-ation*, and similarly other Latinate terminations commonly in use in the English language (such as *-ence*, *-ity*, *-ment*, *-ate*, *-ous*) were used as equivalents for the Latin endings. Moreover, once a loan had been introduced, it was frequently used as a root from which further words could be formed by means of affixation.

This process of borrowing did not only involve the adoption of single words, but also of prefixes and suffixes, which were used more and more often to create new terms. For example, if we consider combining forms of classical origin such as *-ology* and *-meter*, we can see many new English words created in the 17th century including these suffixes: *archaeology* (1607),[2] *pathology* (1611), *meteorology* (1620), *ichthyology* (1646), *zoology* (1669), *osteology* (1670), *mineralogy* (1690), *psychology* (1693), *barometer* (1665), *hydrometer* (1675), *hygrometer* (1670), *micrometer* (1670), *thermometer* (1633). Moreover, there was great awareness of the use of the various processes of affixation, as the following criticism by Richard Bentley of Charles Boyle's creation of the word *cotemporary* confirms:

> For the Latins never use *Co* for *Con*, except before a Vowel, as *Coequal*, *Coeternal*; but before a Consonant they either retain the N, as *Contemporary*, *Constitution*; or melt it into another Letter, as *Collection*, *Comprehension*. So that the Examiner's [i.e. Boyle's] *Cotemporary* is a word of his own Coposition, for which the Learned World will cogratulate him. (Bentley 1699; quoted in Barber 1976: 89)

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2   The date indicates when the first appearance of the word is recorded in *The Oxford English Dictionary*.

based on the pragmatic principle of maximum transparency, which is extremely important in specialized discourse (cf. Chapter 2). In the application of this principle, the specialist created terms in such a way that their form clearly reflected the concept to which it referred. Some examples can be taken from Ralph Lever's *The Arte of Reason, Rightly Termed, Witcraft*, in which the author, in need of new terms, invented transparent forms such as *witcraft* (= logic), *endsay* (= conclusion), *naysay* (= negation), *saywhat* (= definition), *yeasay* (= affirmation), *forespeache* (= preface). These terms may seem so strange as to suggest a desire for idiosyncrasy on the part of the author. Conformity to the criterion of transparency is instead confirmed by Lever's own words:

> Therfore (gentle reader) if thou doubt, what is ment, by any of our strange and new deuised termes, consider their partes, as they are taken by themselues alone: and the consideration of the partes, shall leade thee to the knowledge of the whole. (Quoted in Jones 1953: 129)

In the controversy on inkhorn terms, Lever takes the side of those who condemn borrowing, mainly because he considers loans too opaque. In fact, he states:

> An arte is to be taughte in that toung, in whiche it was neuer written afore. Nowe the question lyeth, whether it were better to borrowe termes of some other toung, in whiche this sayde Arte hath bene written; and by a litle chaunge of pronouncing, to seeke to make them Englishe wordes, which are none in deede; or else of simple vsual wordes, to make compounded termes, whose seuerall partes considered alone, are familiar and knowne to all english men? For trial hereof, I wish you to aske of an english man, who vnderstandeth neither Greek nor Latin, what he conceiueth in his mind, when he heareth this word a backset, and what he doth conceiue when he heareth this terme a Predicate. And doubtlesse he must confesse, if he consider the matter aright or haue any sharpnesse of wit at al, that by a backset, he conceiueth a thing that muste be set after, and by a predicate, that he doth vnderstande nothing at all. (Quoted in Barber 1976: 93)

The same criterion of transparency was followed by several other specialists, such as Robert Recorde and Arthur Golding. In his mathematical treatise (*Castle of Knowledge* 1556), Recorde invented terms such as *likejamme* for parallelogram, *tweylike* and *threlike triangles* for isosceles and equilateral triangles, while in *A Woorke*

Concerning the Trewnesse of the Christian Religion (1587), Golding created words such as *fleshstrings* for muscles and *primetime* to indicate an early period of world history.

As we can see, these transparent terms were usually obtained by means of the juxtaposition of words already existing in the English language. This process of compounding was particularly favoured by the brevity of English words; in fact, most were monosyllables and could therefore be easily linked to form compounds, which in turn were not too long. The facilitating effect that the presence of monosyllables had on the possibilities of forming compounds was perceived as a great advantage offered by the English language. As Lever states,

> As for deuising of newe termes, and compounding of wordes, our tongue hath a speciall grace, wherein it excelleth many other, and is comparable with the best. The cause is, for that the moste parte of Englyshe wordes are shorte, and stande on one sillable a peece. So that two or three of them are ofte times fitly ioyned in one. (Lever, *The Arte of Reason*; quoted in Jones 1953: 126)

Another advantage was considered to be the fact that monosyllables could best represent the concepts they stood for. One of those sharing this opinion is Camden, who states:

> As for the Monosyllables so riche in our tongue which were not so originally, although they are vnfitting for verses and measures, yet are they most fit for expressing briefly the first conceipts of the minde, or *Intentionalia* as they call them in schooles: so that we can set downe more matter in fewer lines, than any other language. (Camden 1605: 21)

It is interesting to note in the quotation above how one of the advantages that monosyllables were believed to give is conciseness, which is another of the qualities scientists consider most important in the structure of specialized discourse (cf. Chapters 2 and 3).

4. The conciseness of language

The principle of conciseness and economy of discourse was often pointed out by specialists. Sentences should be as concise as possible, with no space given to unnecessary details. Here, for example, is the advice Bacon gives as regards the style of a scientific text:

> Never cite an author except in a matter of doubtful credit: never introduce a controversy unless in a matter of great moment. And for all that concerns ornaments of speech, similitudes, treasury of eloquence, and such like emptinesses, let it be utterly dismissed. Also let all those things which are admitted be themselves set down briefly and concisely, so that they may be nothing less than words. (Bacon 1620 / 1968: IV, 254)

These stylistic indications were accepted by subsequent men of science and codified by the Royal Society. In fact, Article IV of Chapter V of the Statutes of the Royal Society (1728) reads:

> In all Reports of Experiments to be brought into the Society, the Matter of Fact shall be barely stated, without any Prefaces, Apologies, or Rhetorical Flourishes, and entered so into the Register-Book, by order of the Society.

This preference for a clear, simple style was generally accepted by 17ᵗʰ-century scientists. In fact, from the description of the activity of the Royal Society given by Thomas Sprat we can see that the way its members wrote was in keeping with the principles pointed out by Bacon:

> They have therefore been most rigorous in putting in execution, the only Remedy, that can be found for this *extravagance*: and that has been, a constant Resolution, to reject all the amplifications, digressions, and swellings of style: to return back to the primitive purity, and shortness, when men deliver'd so many *things*, almost in an equal number of *words*. They have exacted from all their members, a close, naked, natural way of speaking; positive expressions; clear senses; a native easiness; bringing all things as near the Mathematical plainness, as they can: and preferring the language of Artizans, Countrymen, and Merchants, before that, of Wits, or Scholars. (Sprat 1667 / 1959: 113)

As is evident from this quotation, the criteria of economy and directness of reference stand out conspicuously, with particular

449) belongs to the former case. The latter proposal, instead, implied the use of languages other than English: either natural or artificial. Bacon, for example, suggested a language similar to Chinese in which "there are in use [...] certain *real characters*, not nominal; characters, I mean, which represent neither letters nor words, but things and notions" (*De augmentis*: VI, 1). This use of 'real characters' would not only have the advantage of being more precise, but could also be employed at an international level. In fact, as Bacon continues,

> Insomuch that a number of nations whose languages are altogether different, but who agree in the use of such characters (which are more widely received among them), communicate with each other in writing; to such an extent indeed that any book written in characters of this kind can be read off by each nation in their own language. (Bacon, *De augmentis*: VI, 1)

In line with Bacon's proposal is John Wilkins' elaboration of a universal language,[3] which is based on the following principle:

> If to every thing and notion there were assigned a distinct Mark, together with some provision to express grammatical Derivations and Inflexions; this might suffice as to one great end of a Real Character, namely, the expression of our Conceptions by Marks which should signifie things and not words. And so likewise if several distinct words were assigned for the names of such things, with certain invariable Rules for all such Grammatical Derivations and Inflexions, and such onely, as are natural and necessary, this would make a much more easie and convenient Language than is yet in being. (Wilkins 1668: 20-21)

5. The evolution of the syntax of scientific English

The 17ᵗʰ century also showed interesting developments in the syntactic features of scientific English. Unlike the lexical field, changes took place in a non-explicit way, as scientists were usually unaware of the syntactic modifications that they were introducing into the language by means of their writings. The new perspective that characterized

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3   On the subject of universal languages cf., among others, Slaughter (1982).

their research method conflicted with the constraints of the language and forced them to adapt its rules to their expressive needs. As Halliday's (1988) analysis of some extracts from Newton's *Treatise on Opticks* (written in 1675-87 and published in 1704) shows, certain syntactic changes took place in that period. An analysis of the following two theorems formulated by Newton may help in the identification of the main features of such changes:

1. The Excesses of the Sines of Refraction of several sorts of Rays above their common Sine of Incidence when the Refractions are made out of divers denser Mediums immediately into one and the same rarer Medium, suppose of Air, are to one another in a given Proportion.
2. The proportion of the Sine of Incidence to the Sine of Refraction of one and the same sort of Rays out of one Medium into another, is composed of the Proportion of the Sine of Incidence to the Sine of Refraction out of the first Medium into any third Medium, and of the Proportion of the Sine of Incidence to the Sine of Refraction out of that third Medium into the second Medium. (Experiment 8)

As we can see from this passage, sentences were quite long, with very lengthy noun phrases preceding and following the verb. Moreover, the verb (exemplified in this case by *are* and *is composed of*) started assuming the copular function usual in modern scientific English, where the verb merely links the very long nominal phrases coming before and after it. Each sentence was structurally simple, with few or no subordinate clauses, complying with the modern preference for co-ordination rather than subordination in sentence structure. If we examine another sentence of the text, other interesting details may be noted:

> Now those Colours argue a diverging and separation of the heterogeneous Rays from one another by means of their unequal Refractions.

In the quotation above there is a large number of words referring to processes (such as *diverging, separation, refraction*). This indicates a distinct preference for the use of nouns deriving from verbs. The increase in the use of nominalization was part of a gradual tendency towards a loss of importance of the verb, compensated by a growth of importance of the noun. This change was mainly for textual reasons, as the process of nominalization enabled the scientist to include more

information in the same sentence and guaranteed a better flow of discourse. Moreover, this process promoted a better cohesion of the text by means of the recovery of the information given in the previous statement as the theme of the following sentence. This linear process is observable not only in texts describing external transformation, as in '*a* leads to *x*' (cf. 1 below), but also in texts where discovery is the result of an internal heuristic process ('*a* makes me think of *x*'; cf. 2). The nominalization process in each text is summarised by Halliday as follows:

1. *a* happens; so *x* happens
   because *a* happens, *x* happens
   that *a* happens causes *x* to happen
   happening *a* causes happening *x*
   happening *a* is the cause of happening *x*

2. *a* happens; so we know *x* happens
   because *a* happens, we know *x* happens
   that *a* happens proves *x* to happen
   happening *a* proves happening *x*
   happening *a* is the proof of happening *x* (Halliday 1988: 174)

If we observe the verb in the last quotation taken from Newton's text we may perceive another interesting feature that started to emerge: a tendency towards depersonalization. In fact, rather than use a form such as "From those colours we could argue ...", the author wrote: "those colours argue ...", thus choosing the more objective and impersonal style typical of modern scientific texts.

6. Conclusions

This analysis of 17th-century scientific texts has thus provided abundant evidence for the great increase in the lexis of the language to be used in specialized fields which made the English tongue more suitable for the expression of any kind of subject. This increase was obtained through the adoption of the various possibilities that the

language offered for the formation of new words: addition of meanings to terms already in use, derivation from existing lexical items by means of affixation and compounding, as well as borrowing from other languages. Moreover, classical languages provided many affixes and combining forms for the formation of transparent compounds, which enabled scientists to set up useful, clear taxonomies in various fields. From the syntactic point of view, the centuries following the 17ᵗʰ have also developed and consolidated the features identified in Newton's text, with an increase in the processes of nominalization and objectification of specialized discourse.

VI. The Origins of the Experimental Essay

The experimental essay originated in the Early Modern English period as a result of a complex process of scientific evolution which determined the need for a new expository genre to suit the new epistemic approach of 17th-century 'natural philosophers'. Their need could no longer be satisfied by the traditional essay, as this mainly followed principles and employed techniques of a prevalently literary type. The innovative characteristics of this new text type derived from the great importance attributed to the experimental process in the research programmes of Early Modern English men of science, who – elaborating on Francis Bacon's intuitions – shared the principle that the progress of knowledge could not be based on the servile observance of traditional theory, but should rely on the observation of natural phenomena and accurate experimental activity. According to Bacon, therefore, the correct way for a scientist to deal with past theory should be to "read not to contradict and confute, nor to believe and take for granted [...] but to weigh and consider" (quoted in Houghton 1975:12).

The years immediately following Bacon's teachings witnessed the presence of both philosophical approaches: the deductive and the inductive. Some natural philosophers continued to write their works relying mainly on past authority, usually starting out from the citation of an ancient or medieval philosopher and demonstrating the correctness or incorrectness of his views by means of deductive theoretical argumentations. Others, instead, based the evidence of their theoretical claims on direct experience and personal observation. This was the attitude taken by the large group of scientists who in the 17th century promoted the formation of the Royal Society. In their preliminary meeting on 28th November 1660 the founders of the Royal Society determined that the purpose of their gathering was "a designe of founding a Colledge for the promoting of Physico-Mathematicall Experimentall Learning" (quoted in Boas Hall 1991: 9), and chose the phrase *Nullius in verba* as their motto. These new researchers were

writer to fall into redundancy or repetition. In particular, opinions expressed by others or information which can easily be found in other papers are generally omitted.

The abundance of detail and the precision of the narration of the experimental events may be attributed to the writer's willingness to provide his readers with as many opportunities as possible to understand his report clearly, not only in order to enable them to come to appropriate conclusions, but also to repeat the same experiment in their own laboratories, and thus prove his results to be more reliable. Moreover, the minuteness of detail and the accuracy of the narration is meant to make repeatability easier and thus encourage the growth of empirical practice in the community of scientists. Boyle confirms the proselytizing aim of experimental essays in his preface to the *Proemial Essay*, where he encourages his model reader, Pyrophilus, to carry out experimental activity:

> I was also hopeful, that the easiness of divers things inviting you to make trial of them, and keeping you from being disappointed in your expectations, the success of your first attempts would incourage you to make trial also of more nice and difficult experiments. (Boyle 1772 / 1965: I, 306)

This emphasis on the promotional purpose of the experimenter's writings betrays the strong feeling of belonging to a new scientific community which animated the members of the Royal Society. This zealous spirit helps explain why so much detail is provided in Early Modern English experimental essays. Though it led some of them into a sort of prolixity and drudgery, their purpose was to contribute to the advancement of science and not to gain any personal advantage:

> By the way of writing, to which I have condemned myself, I can hope for little better among the more daring and less considerate sort of men, should you shew them these papers, than to pass for a drudge of greater industry than reason, and fit for little more, than to collect experiments for more rational and philosophical heads to explicate and make use of. But I am content, provided experimental learning be really promoted, to contribute even in the least plausible way to the advancement of it; and had rather not only be an under-builder, but even dig in the quarries for materials towards so useful a structure, as a solid body of natural philosophy, than not do something towards the erection of it. (Boyle 1772 / 1965: I, 307)

A further reason that justifies the experimenter's recourse to this detailed narrative technique is his need to acquire official recognition of his results. Indeed, the detailed and accurate description of his personal scientific experience was considered one of the requisites for transforming a personal account into an official protocol to be submitted to the broad community of men of science. The careful and objective narration of one's experiments may provide the materials for proper scrutiny and reliable judgement, and thus permit the transformation of personal results into facts widely accepted by the scientific world. Having obtained in this way the consensus of a wider public, experimental data can become 'matters of fact' and part of scientists' shared culture.

However, the criterion of conciseness is subordinate to the higher principle of clarity of exposition, which is considered the most important in terms of perlocutionary value. Indeed, the principle of the avoidance of verbosity so often maintained by Sprat and the other members of the Royal Society is neglected whenever the author runs the risk of being too brief and therefore unclear. This hierarchy of criteria is confirmed by the following passage, in which Boyle apologizes for the impression of verbosity that some parts of his essays might create:

> I have knowingly and purposely transgressed the laws of oratory in one particular, namely, in making sometimes my periods or parentheses over-long: for when I could not within the compass of a regular period comprise what I thought requisite to be delivered at once, I chose rather to neglect the precepts of rhetoricians, than the mention of those things, which I thought pertinent to my subject, and useful to you, my reader. (Boyle 1772 / 1965: I, 305)

1.2. Lack of assertiveness

A second feature of this text type is that there is no need for the author to arrive at definite conclusions or to systematise the results obtained; the data are to be reported as they are observed, without the writer being required to accompany them with hypotheses or comments. This allows the researcher to report all the details of his experimental activity, even those that he might not be able to explain, thus reducing his theoretical responsibilities and the risk of being criticized, as

'having for the most part the liberty to leave off when he pleases, is not obliged to take upon him to teach others what himself does not understand' (Boyle 1772 / 1965: I, 303).

These experimental accounts, however, provide the identification of useful superstructures on which other scientists might be able to build appropriate theories. The same principle enables writers to report also experiments that have been unsuccessful, as the analysis of these experiences might help the reader not to make the same mistakes as those reported or enable him to draw interesting conclusions. Also in promoting the reporting of even unsuccessful experiments 17th-century scientists were following Bacon's teachings:

> No one should be disheartened or confounded if the experiments which he tries do not answer his expectation. For although a successful experiment be more agreeable, yet an unsuccessful one is oftentimes more instructive.
>
> (Quoted in Hacking 1983: 247)

A feature that clearly stands out in reading Early Modern English experimental essays is the frequent use of the narrating technique compared with the very limited space allotted over to the author's reflections. Also the introduction to the experimental essay is usually very short, and briefly outlines the purpose of a series of connected experiments. This confirms the non-argumentative but mainly informative purpose of the genre.

1.3. Perspicuity

As regards the way experimental essays should be written, the prevailing opinion is that authors should adopt a 'philosophical' rather than a 'rhetorical' style – that is, a style which does not coincide with the traditional way of writing, typical of literary and philosophical works. Underlining a need widely felt by the contemporary world of science, Boyle stresses the fact that the expressions used in experimental writings should be "rather clear and significant, than curiously adorned" (Boyle 1772 / 1965: I, 304). This choice of a more referential language is due to the very function of the paper, which is to provide information in as clear a way as possible:

> And certainly in these discourses, where our design is only to inform readers, not to delight or persuade them, perspicuity ought to be esteemed at least one of the best qualifications of a style. (Boyle 1772 / 1965: I, 304)

This is the reason why in several scientific texts of this period we find a strong condemnation of metaphors, which are usually seen as deceitful devices. The scientific community is convinced that the use of unnecessary rhetorical devices in specialized literature can hinder the comprehensibility of the text; Boyle depicts the negative consequences on the informative value of the paper itself with the aid of the following comparison:

> And to affect needless rhetorical ornaments in setting down an experiment, or explicating something abstruse in nature, were little less improper, than it were (for him that designs not to look directly upon the sun itself) to paint the eye-glasses of a telescope, whose clearness is their commendation, and in which even the most delightful colours cannot so much please the eye, as they would hinder the sight. (Boyle 1772 / 1965: I, 304)

As can be seen from this passage, rhetorical devices are not to be banned from scientific texts completely, but they should be avoided when unnecessary, when they do not improve the illustrative value of the paper but, on the contrary, only make the text more confused and more difficult to understand. On the other hand, Boyle is also careful to note the opposite risk, that is, the adoption of a dull mode of expression:

> For though a philosopher need not be sollicitous, that his style should delight its reader with his floridness, yet I think he may very well be allowed to take a care, that it disgust not his reader by its flatness, especially when he does not so much deliver experiments or explicate them, as make reflections or discourses on them. (Boyle 1772 / 1965: I, 304-305)

And, to reinforce his point, he makes use of a very effective simile:

> Thus (to resume our former comparison) though it were foolish to colour or enamel upon the glasses of telescopes, yet to gild or otherwise embellish the tubes of them, may render them more acceptable to the users, without at all lessening the clearness of the object to be looked at through them.
> (Boyle 1772 / 1965: I, 305)

of them being either new or adapted from foreign languages. A very balanced position on the subject is adopted by the majority of the members of the Royal Society, who condemn the unjustified use of foreign loans or strange terms and therefore try to avoid them when other English words with the same meaning are available. But they are also aware that recourse to specific terminology is at times unavoidable, as certain specialized concepts require new names, which are not available in English.

Another criticism often made by scientists concerns the polysemy characterising most words in a language and which often makes texts ambiguous. Scientists cannot tolerate the uncertainty of meaning provided by existing words and condemn all those who do not use language accurately. It is however true that when redefining the properties of already-studied compounds or facts, a scientist would frequently continue to employ existing vocabulary in spite of the fact that the use of an old term to refer to a new concept would create a mismatch between the existing *signans* and its new *signatum*. Boyle himself followed this practice. Indeed, when reporting his pneumatic discoveries in *New Experiments* he specified the concept of a totally void space by making use of the existing term *vacuum*, which was commonly employed by the English-speaking community to refer to the amount of air present in an exhausted receiver. However, he tried to avoid problems of ambiguity by specifying the context of reference to which his terms should be attributed. For example, in using the term *vacuum*, to which many of his contemporaries continued to attribute its traditional metaphysical meaning, Boyle was careful to specify the physical significance he conferred on it:

> By which I here declare once for all, that I understand not a space, wherein there is no body at all, but such as is either altogether, or almost totally devoid of air. (Boyle 1772 / 1965: I, 10)[3]

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3   In spite of this criticism, Boyle himself is not completely free from blame. Indeed, he sometimes makes inconsistent use of terminology, as in *New Experiments*, where he refers to the heaviness of the cover of the empty vessel as "spring of the external air", "force of the internal expanded air and that of the atmosphere" or "pressure". In the same text, the term "pressure" is often used interchangeably with "protrusion" (e.g. Boyle 1772 / 1965: I, 11) or to refer both to spring and weight (e.g. Boyle 1772 / 1965: I, 18, 76).

(7)   His jaws, which were formerly shut, gaped exceeding wide, as if they had been stretched open by some external violence. (Boyle 1772 / 1965: III, 358)

A confirmation of the close connection between the use of the passive and the attribution of responsibility for an unpleasant consequence to external forces, and not to the experimenter himself, can be seen in the following sentence, in which Boyle prefers to use the passive of *to kill* rather than the active of the verb *to die*:

(8)   She continued, by our estimate, above two hours and half in the exhausted receiver without giving clear proof of her being killed.

(Boyle 1772 / 1965: III, 357)

Another case in which the passive is frequently used is in reporting how certain procedures (usually involving the utilization of equipment) have been carried out. The shift from the active to the passive voice in these cases underlines the passing from the active role of narration of events to the description of procedures that are becoming standardized in the experimenter's repertoire or in that of scientists in general:

(9)   A chemical pipe sealed at one end, and 36 inches, or somewhat less, in length, was filled with water, and inverted into a glass vessel, not two inches in diameter, but ¼ of an inch, or little more in depth. These glasses being conveyed into a fit receiver, and the air being leisurely pumped out, and somewhat slowly readmitted, the numerous bubbles that had ascended during the operation, constituted at the top an aërial aggregate, mounting to 8/10, wanting about an hundredth part of an inch. Presently after the tube (by and by to be described) was filled again with the same water, and inverted; and the water being drawn down to the surface of the vesseled water, and the air let in again, the water was impelled up to the very top, within a tenth and half a tenth of an inch. (Boyle 1772 / 1965: III, 361)[4]

The confirmation that the actions described here are not novel, but rather a standardized procedure comes from the text itself, as the author clearly refers to them as "matter of fact" (Boyle 1772 / 1965: III, 362). Indeed, when he comes to underline the originality of the

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4   More examples of passive forms used in Boyle's papers to report standardized procedures can be found in Dear (1985).

experimental events he is describing in the following paragraphs, the writer resorts to the use of the active form:

(10)   We provided a clear round glass […]. We conveyed the glass […]
                                            (Boyle 1772 / 1965: III, 362)

1.5. Objectivity

Another quality which should be reflected in the style adopted by the experimental writer is his honesty. This quality requires the researcher to report events faithfully and sincerely, and to express his opinions and conclusions with the degree of positiveness corresponding to the certainty of the facts described, using the various modal expressions that the English language offers to suit the different degrees of certainty of the facts reported; here is an explanation for this writing policy:

> Perhaps you will wonder, Pyrophilus, that in almost every one of the following essays I should speak so doubtingly, and use so often, *perhaps, it seems, it is not improbable*, and such other expressions, as argue a diffidence of the truth of the opinions I incline to, and that I should be so shy of laying down principles, and sometimes of so much as venturing at explications. But I must freely confess to you, Pyrophilus, that having met with many things, of which I could give myself no one probable cause, and some things, of which several causes may be assigned so differing, as not to agree in any thing, unless in their being all of them probable enough; I have often found such difficulties in searching into the cause and manner of things, and I am so sensible of my own disability to surmount those difficulties, that I dare speak confidently and positively of very few things, except of matters of fact.
>   (Boyle 1772 / 1965: I, 307)

This careful attitude prompts the author to use modal expressions and verbs like *to seem* and *to appear* to report with caution the actions as he perceives them, as can be seen in the following quotation:

(11)   His body seemed to be perpendicular to the horizon. […] We perceived him to lie stark dead with his belly upwards. […] The other frog […] seemed to be distressed. […] She appeared to be very much disquieted.
                                            (Boyle 1772 / 1965: III, 359)

The same prudence is shown by hedging expressions, usually placed in parentheses:

(12)   The frog was perfectly alive, and continued to appear so (if I am not mistaken) near an hour. (Boyle 1772 / 1965: III, 359)

(13)   She seemed at first (which yet I am not too confident of, upon a single trial) to continue well somewhat longer than a hen in her condition would have done.
(Boyle 1772 / 1965: III, 355)

(14)   Such an inflation (though not great) we thought we observed; but until farther trial, I dare not acquiesce in it. (Boyle 1772 / 1965: III, 360)

In taking this cautious attitude, the experimenter not only shows his professional correctness in that he reports actions as he perceives them with the appropriate degree of certainty, but offers a picture of himself as a reliable and faithful witness to the events that he is reporting.[5] Moreover, in order to make his narration more reliable, he carefully inserts the testimony of his collaborators:

(15)   I could not, I say, discern the difference to amount to above, if so much as an hair's breadth; and the chief operator in the experiment professed, that, for his part, he could not perceive any difference at all.
(Boyle 1772 / 1965: III, 362-3)

Although the narration mainly reports the events in an objective way, the essay also includes mention of the experimenter's reactions, but these are usually expressed in brief hints, often relegated to parenthetical phrases:

(16)   Whilst the air was drawing out, the lesser frog skipped up and down very lively, and, somewhat to our wonder, clambered up several times to the sides of the receiver. (Boyle 1772 / 1965: III, 358)

Moreover, it was easier to secure acceptance of experimental results by the scientific community if a higher degree of officialness was

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5   In this way 'ethos' is built up. Cf. Bazerman: "How does one convince a critical audience that something happened when they didn't see it? One rhetorical strategy is to establish ethos; that is, that the author / observer is a credible witness, following all proper procedures thoughtfully and carefully." (Bazerman 1988: 140)

conferred on the experiment itself. This is the reason why the researcher often invited persons of a certain standing to be present while he was carrying out his activities. The presence of these reliable witnesses, explicitly noted in the experimental report, provided official substantiation to the procedures and results narrated. For example, to confirm his experiments concerning respiration, Boyle adds the following statement:

(17)   For confirmation of which, I have this to alledge, that, having in the presence of some virtuosi provided for the nonce a very small receiver, wherein yet a mouse could live some time, if the air were left in it, we were able to evacuate it at one suck, and by that advantage we were enabled, to the wonder of the beholders, to kill the animal in less than half a minute.

(Boyle 1772 / 1965: III, 370)

The confirmation provided by the presence of esteemed and reliable witnesses proves particularly useful in cases in which novel or expensive apparatus is used to carry out the experiment. Although not able to repeat the experience in his own laboratory, the reader – provided with a detailed account of the events and reassured by the presence of reliable spectators – is nevertheless able to scrutinize the contents of the report, and – by means of this process of 'virtual witnessing' (Shapin 1984) – he can make a correct evaluation of them. Another important principle followed in the writing of experimental essays was to reproduce in that activity the same distinction correctly adopted by the scientist between the setting out of the facts observed and his considerations on them. Indeed, Boyle suggests leaving "a conspicuous interval" (Boyle 1772 / 1965: I, 2) on the page between the two textual parts (report of experimental findings and reflections on them) so as to show the methodological procedure adopted while underlining the rhetorical and pragmatic difference between those two parts. This approach to the analysis of scientific phenomena can also be found in the researcher's habit of examining facts and opinions critically and severely, while at the same time respecting the people whose views and conclusions are being considered. On this subject Boyle writes: "For I love to speak of persons with civility, though of things with freedom."(Boyle 1772 / 1965: I, 312)

This impersonal way of analyzing other scientists' conclusions and attacking wrong or inconsistent ideas allows the argumentative paper to be accepted more readily and highlights its persuasive strength, thus increasing its perlocutionary effect, which consists in convincing the reader of the validity of the writer's thesis. The advantages of this approach are clearly perceived by Boyle:

> And as for the (very much too common) practice of many, who write, as if they thought railing at a man's person, or wrangling about his words, necessary to the confutation of his opinions; besides that I think such a quarrelsome and injurious way of writing does very much misbecome both a philosopher and a Christian, methinks it is as unwise, as it is provoking. For if I civilly endeavor to reason a man out of his opinions, I make myself but one work to do, namely, to convince his understanding; but, if in a bitter or exasperating way I oppose his errors, I increase the difficulties I would surmount, and have as well his affections against me as his judgment: and it is very uneasy to make a proselyte of him, that is not only a dissenter from us, but an enemy to us. (Boyle 1772 / 1965: I, 312)

2. The evolution of the experimental essay

The experimental essay was widely accepted by the scientific community of the 17th century. The various advantages it offered made it become very widespread, and its popularity became even vaster with the increase in circulation of scientific journals, which mainly consisted – apart from letters and reviews – of brief reports of experimental activity.[6] The first scientific journal to appear in England was the *Philosophical Transactions* (1665) edited by Henry Oldenburg, and various members of the Royal Society published many experimental essays in it. The Early Modern English model of experimental essays greatly influenced the subsequent realizations of this text type. As Bazerman (1988) notes in his analysis of the first 135 years of the *Philosophical Transactions*, the basic narrative structure of early scientific experimental reports was retained into the

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6   For further details on early scientific papers cf., among others, Houghton (1975), Kronic (1976), McKie (1979) and Manten (1980).

VII. The Formation of the Lexis of Computer Science

Although it is a fairly recent subject, information science has rapidly assumed a very important role in the modern world. The use of computers has become more and more widespread in all countries as too has the vocabulary related to this field. Since it is a relatively new branch with specific concepts and tools, information science has developed its own terminology, part of which derives from other disciplines or from general English, and part of which has been devised for this discipline only. The main purpose of this chapter is to examine the lexis used in computer science texts, in order to ascertain the processes most commonly used in the formation of their terms. Such processes will be compared to those commonly adopted in general English and any possible discrepancies will be pointed out. Comparisons will also be made with the main features of other specialized languages in order to discover similarities and differences. The second part of the chapter will take into consideration some recently-coined terms belonging to the lexis of computer science, in order to ouline the processes of word-formation employed.

1. Main features of the lexis of computer science

Before starting our analysis some clarifications ought to be provided: not all the words used in computer science texts will be taken into consideration here. Of the three categories of lexis found in scientific and technical texts by Inman (1978) – functional, subtechnical and technical words – only the latter will be taken into consideration. Subtechnical words, instead, will be neglected as they are context-independent and occur in several disciplines. Moreover, the language examined here is that used by specialists of computer science to

communicate with other specialists as regards computers, their functioning and their applications. Such language is to be considered part of the English language itself, and should not be confused with 'programming languages' (such as FORTRAN, BASIC, COBOL, ALGOL, etc.), that is, the symbolic codes based on numbers and letters used by programmers to give instructions to computers. Such machine-oriented languages will not be taken into consideration in our analysis.

1.1. Specialization and borrowing

The first category of words found in the language of computer science includes all words borrowed from the general language and to which a new contextual meaning is given. This is the case, for example, of words such as *hardware*, *chat group*, *program* and *disk*. The latter two words draw our attention to a prime feature of this specialized language, which consists of a preference for American spelling. This preference is due to the supremacy that the American computer industry has achieved not only in the development of the technological know-how of such a field, but also in the creation of its language, widely used in manuals and literature illustrating hardware and software made in the U.S.A. and exported all over the world.

Another method of borrowing general English words to make up the terminology of computer science is the use of metaphors. The recurrence to metaphorical processes is quite frequent, especially in the early stages of development of a new discipline when the concepts are still rather vague and can therefore be named only tentatively. This process is vital for the formulation of new concepts as at their inception these can only be explained by reference to a vague and sometimes even erroneous analogy to existing objects or processes. Common examples of the metaphorical transfer of everyday words into computer science texts are *memory*, *address*, *bus*, *gate*, *store*, *menu*, *domain*, *mouse* and *spamming*. The explanation of the metaphorical process in the adoption of the latter term is thus made clear:

all specialized discourse. Some examples of the results of this compression technique are *alphameric* (derived from *alphanumeric*), *digitize* (from *digitalize*), and *optronics* (from *optoelectronics*). All the cases reported so far are examples of internal borrowing from the English language; rarely are terms borrowed from other languages; those deriving from Latin (cf., for example, *catena* and *post-mortem*) are representative of the 'Fifth Borrowing' (Hughes 1988), that is, of the fifth stage of the process of classical borrowing, characterized by the enormous influx of technical terminology in the 19th and 20th centuries, meant to confer a universal possibility of usage on the neologisms based on these languages (cf. Nybakken 1959).

1.2. Neology

When new words are required and cannot be borrowed from general English, or other specialized languages or from foreign languages, they are expressly created for the purpose. There are some cases in which the origin of a certain form is difficult to trace, and the coinage of the term does not seem to follow a logical criterion. This might be the case of the word *byte*, whose various suggested explanations – a blend of *bit* and *bite* or an acronym of the expression *Binary digIT Eight* (Illingworth 1985: 14) – have not been found sufficiently satisfactory. In general, however, the coinage of a new term makes use of the traditional analytic and syntactic processes of English word-formation (cf. Bauer 1983). One of the processes most frequently employed is that of derivation. By means of the most common prefixes and suffixes present in general English and used also in other specialized languages, new computer science terms are formed. Some examples of this affixation technique are: *autocode, debug, interfix, kilobyte, macroprogramming, megabit, microcoding, mini-computer, misfeed, multiaddress, non-formatted, postprocessing, pre-edit, re-compile, subroutine, debugger, diskette, buffering* and *processor*.

Another process very frequently used in word-formation is analogy. By means of this technique a new word is formed by being modelled on an already existing lexeme. An example of this process is the term *software*, created on the analogy of *hardware*. The need for a term to distinguish the computer from its programs has induced the

preceding one(s) specifies its property. Such specification may either concern the material of which a certain item is made (e.g. *ferrite core, silicon chip*, etc.) or its use (*access arm, control byte, load program*, etc.). Often, after a certain period of usage, some of these compounds are joined either by a hyphen or fused into a single word: e.g. *flowchart, plugboard, sumcheck, on-line*, etc.

Compounds often include more than two words, and groups of three, four and even five words are frequently found: *batch processing mode, communications line control procedure, address translation slave store*, etc. Longer groups are not very common, as they may present great difficulties of comprehension. In order to interpret them correctly, the decoder usually groups the various items of the compound in appropriate segments of meaning: e.g. *(((block fill-in) (data control)) process)* or *(((IBM system/360) (operating system)) assembler program)*. The long compound groups, indeed, are generally considered cumbersome and complicated; therefore, they are often simplified by means of a process of ellipsis. Thus, for example, *alphabetic character string* is usually reduced to *alphabetic string, asynchronous data transmission* becomes *asynchronous transmission, floppy disk drive* becomes *floppy drive*, and so on. In spite of the abolition of one of the terms of the multiple compound no risks of misunderstanding are likely to arise, as the word omitted can be easily reconstructed from the context. Another way of making compounds shorter is the blending of the various elements into single words. Some examples of these telescoped words[1] are *bit* (from *binary digit*), *infocenter* (from *information center*), *modem* (from *modulator/demodulator*) and *datamation* (from *data automation*). An interesting case of telescoped terms is represented by *pixel*, which is the result of the blending of the words *pictures element*. Instead of the term *pictel* (deriving from *PICTures ELement*), the creator of this word made use of the colloquial abbreviation *pix* corresponding to the word *pictures*.

The derivation of words from a colloquial register of the language is not confined to this example, but is confirmed by other

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1   Telescoped words are also called 'portmanteaux', a term invented by Lewis Carroll in *Through the Looking Glass* (1872); in fact, Humpty Dumpty observes that "'slithy' means 'lithe and slimy' [...] You see it's like a portmanteau – there are two meanings packed into one word."

terms, such as *bootstrap* (meaning the technique of loading a program into a computer by means of certain preliminary instructions which in turn call in instructions to read programs and data) whose meaning of support is derived from the idiom *to raise oneself by one's own bootstraps*. These two examples of colloquial expressions – to which we could add several other examples, such as *bug* (meaning 'fault'), borrowed from the informal register of general English – represent a distinguishing trait of the language of computer science. In other specialized languages, in fact, idioms and colloquialisms are not very likely to occur (cf. Gerbert 1970).

1.3. Acronymy and abbreviation

The need to make groups of words as concise as possible leads the computer specialist to create a great many acronyms. The number of acronyms in the language of computer science is very high. Indeed, of all specialized languages one of the most recurrent uses of this device can be noticed in the field of computer science. Some examples are: *ASCII* (for *American Standard Code for Information Interchange*), *RAM* (for *random access memory*), *ROM* (for *read only memory*), *DOS* (for *disk operating system*). Besides being shorter – and therefore easier to recall and pronounce – acronyms are also sometimes devised in such a way as to suggest a certain meaning or arouse special interest. This can be seen, for example, in the formulation of the acronym *BASIC* (standing for *Beginners' All-purpose Symbolic Instruction Code*), which is conceived so as to make the simplicity of the computer language immediately evident. Another example of a 'transparent' acronym is *EDIT* (standing for *Error Deletion by Iterative Transmission*), which evokes at once the function for which such an instruction is used.

Apart from acronyms, this technique of creating a new term to establish associations with other terms is used in other cases of word-formation. For example, a telescoped word such as *bit* may also have been formed in order to suggest a direct similarity with the concept of small quantity which characterizes the analogous general English word. Also the similarity of the pronunciation of the word *byte* to the general English word *bite* has been exploited in the coinage of the

2. Recent developments

The analysis of recent terms used in the language of computer science testifies to a greater recourse to the internal resources of the language of computer science and a far more limited number of loans from other tongues or other specialized languages. Indeed, widespread use is made of the process of derivation, and – in particular – of suffixation. The most commonly used suffix is *-er*, generally used to refer to the person who performs a certain action: e.g. *Internetter* (user of the Internet), *e-mailer* (person who sends e-mail), *lurker* (subscriber to a bulletin board who reads messages but never contributes). Another frequent suffix is *-ing*, mainly used in the derivation of nouns from verbs to refer to a particular process: e.g. *cyberizing* (causing someone to be interested in the use of the computer), *netwriting* (writing on the Internet), etc. The tendency of computer experts to make use of colloquial expressions is confirmed by the adoption of the suffix *-ie*, commonly employed to refer to newcomers to the field of computer science; besides *nettie* (indicating an inexperienced user of the Internet), we have found *newbie*; its meaning is made clear in the following quotation:

> Instead of feeling surrounded by information, first-timers ('newbies' in the jargon of the Net) are likely to find themselves adrift in a borderless sea.
>
> (*Time*, 6 Dec 1993)

Among the prefixes, one of the most common is *re-*, denoting repetition of a certain operation. For example, *remailer* is to be interpreted in this way:

> A remailer is a network-connected computer that takes in e-mail, then sends it on to a destination specified in attached, encrypted instructions, thus placing a veil between sender and receiver. (*Village Voice*, 3 Aug 1993)

Analogical derivations are also common. A recent example is *off-line reader*, a term coined on the semantic opposition between *on* and *off*. The analogical process adopted in the creation of this term is clearly visible in the contrast existing between the process of examining

> The intended effect was to immerse riders in a three-dimensional video game called Cybergate, where they would battle one another for control of the last remaining inhabitable planet in the universe.
>
> (*Wall Street Journal*, 21 March 1994)

When used before compounds, *cyber* is often followed by a hyphen: e.g. *cyber-lifestyle, cyber-rights group, cyber-roadkill*. In several cases the combining form is employed as an independent entity, thus denoting a completely autonomous word: *cyber culture, cyber fender-bender, cyber science, cyber station, cyber world*. A confirmation of the syntactic evolution of this term comes from its adoption for further derivational processes, such as its verbal usage in *cyberize*, which in turn originates *cyberizing* (i.e. causing someone to be interested in the use of the computer). As can be seen from the numerous examples quoted above, the combining form *cyber-* has become very popular in the lexis of computer science, up to the point of representing the most common prefix for denoting the connection of a particular element to this specific field.

   With this meaning it is at present much more productive than the other combining form used for this purpose, namely *info-*. Indeed, in a corpus we have examined – which includes the neologisms in the language of computer science collected and analysed by Algeo / Algeo (1994) – we only found three examples of neologisms making use of this prefix: *infobahn, info pike, info superpike*; as can be seen, all three terms merely refer to the circulation of messages on the net. The loss of popularity of the combining form *info-* compared to *cyber-* can be attributed to two main reasons: *info-* can be considered inadequate for a precise reference to computer science as it is not used exclusively in that field. Indeed, this prefix is also commonly adopted in other sectors – in particular in those connected to the means of mass media communication – as can be seen from the numerous neologisms based on *info-* that have recently been coined: *infomania* (an excessive enthusiasm for the accumulation and dissemination of factual information), *infomercial*[4] (a short advertising film which promotes a product, service, etc. in an informative and purportedly objective and spontaneous style), *infopreneur* (entrepreneur who seeks to profit in

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4   A variant of this term also exists, namely *informercial*, deriving from the combination of the two terms *information + commercial*.

business from the collection and dissemination of information) and *infotainment* (broadcast material which aims to inform and entertain simultaneously).[5] Another reason for the preference of *cyber-* over *info-* is that the latter may be seen as more traditional[6] and not indicative of the innovativeness of this field and of the intense development it has undergone in the past few years. A confirmation of the fact that *cyber-* confers an innovative shade of meaning to specialist jargon comes from the following quotation:

> There was *astro*, then *techno*. Now, *cyber* is the prefix that means 'the future'.
> (*Newsweek*, 5 July 1993)

3. Conclusion

The conclusion which may be reached after examining the lexis of the language of computer science is that the processes of word-formation employed are those commonly used in general English and other specialized languages, that is, borrowing, analogy, metaphor, compounding, acronymy, abbreviation, affixation, specialization and so on. What actually differentiates these processes in the language of computer science if compared to general English is the frequency of their recurrence rather than their nature. To further the great terminological development connected with the continuous and rapid advances in this field, the language of computer science makes use of both internal and external resources. As regards the latter, the most common word-formation process is that of borrowing, which is however applied almost exclusively to the general language and only very rarely to other tongues or other specialized languages. It is to be noted, moreover, that over the years the trend has become bidirectional, as the language of computer science has become a

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5   These examples have been taken from Simpson / Weiner (1993).
6   A confirmation of the greater traditional value connected with *info-* comes from Tulloch (1991: 164): "*Info* has been a popular colloquial abbreviation of *information* for most of this century."

VIII. The Language of Popularisation

The notion of popularisation has attracted several studies, although their conclusions are not always in agreement.[1] There is a basic consensus, however, as to the role of this process, which is usually identified with the conveyance of specialist knowledge for education or information purposes. The main factor that distinguishes a popularisation from a fully specialized text is the lack of discussion, in the former, of new scientific knowledge added to the discipline's conceptual base. The mere lack of innovative theoretical arguments is not sufficient evidence, however, of a popularisation process. Some genres provide no advancement of disciplinary knowledge and yet constitute instances of specialized communication: among these are the review article, the abstract and other genres whose function is mainly informative or comparative of different methodological approaches or research projects. The main criterion for distinguishing between fully specialized texts and popularisations is the different audience targeted. Popularisation in fact addresses not an expert group within the discipline but an audience of non-specialists. This aspect, however, requires further explanation, for unless it is associated with other criteria, the listing of different audiences may be insufficient to formally characterize the text types involved. This is the flaw undermining Darian's (1982) distinction of genres according to five readership groups:

1. Popular magazines, newspapers	Uneducated layman
2. *Scientific American* and popular books	A reader conversant in the general area (e.g. business, social science)
3. High-school text	Layman – limited general knowledge and technical background information

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1   Some of the main studies on the subject are: *Langue française* (1982, issue No. 53), Jacobi (1984a, 1984b), Shinn / Whitley (1985), Myers (1990a, 1990b, 1991, 1994), Valle (1996).

| 4. Introductory college text | Layman – educated to college level of general knowledge |
| 5. Scholarly journal, specialized book-length study (e.g., a volume on optics) | Specialist and advanced graduate student |

<div align="right">(Darian 1982: 29-30)</div>

A satisfactory profile of textual differences is possible instead if we consider not only the audience's competence but also the main purpose of such texts. Publications written primarily for non-specialists operate at no fewer than two different levels: pedagogic texts and popularisations. The former aim to provide students with the 'secondary culture' (Widdowson 1979) expected among scholars in the discipline; specialized discourse is presented therefore in 'disciplinary' terms, to equip the reader with conceptual and terminological resources suited to the subject content; terminological features are addressed systematically, removing any ambiguity of the meaning of new expressions appearing in the discourse as a form of training for new specialists. Typical examples of such texts are undergraduate textbooks and instruction manuals. Popularisations target instead a wide reading public and deal with specialized topics in a language close to general discourse and to the layman's everyday experience. The purpose here is chiefly informative and seeks to extend the reader's knowledge rather than develop a secondary conceptual system. Typical forms of this type of discourse are popular scientific magazines, books published for a wide readership, videocassettes and specialized articles in daily newspapers. In popularisations, the illustration of processes and phenomena is less technical – which usually means less specialized terminology. Disciplinary terms are not employed systematically but given occasionally in a way that has been equated to that of citations (Mortureux 1986). The different purposes of various text genres also influence the expository technique employed: while pedagogic material shows a constant tendency to assimilate not only the content but also the language and style of the 'secondary culture', popularisations remain as close as possible to the primary culture and its language, introducing select terms in a way that replicates the semantic content of general language.

1. Popularisation and translation

The information process established by popularisation has often been compared to that of translation. Both of these involve the transformation of a source text into a derived text. It is impossible to conceptualise the target of a translation without a source (Newmark 1981) and, similarly, every popularisation implies the presence of a specialized text. The popularisation process is a kind of redrafting that does not alter the disciplinary content – object of the transaction – as much as its language, which needs to be remodelled to suit a new target audience. In the process, information is transferred linguistically in a way similar to periphrasis or to intralinguistic translation. In the past, periphrasis was generally analysed within the disciplinary boundaries of rhetoric; but today the redrafting phenomena of popularisation are normally investigated by linguists, as part of research into the intricate world of levels and registers associated with different language varieties. Another aspect that suggests this analogy between popularisation and translation is the fact that both processes tend to produce an imperfect equivalence of the source text. A popularised text approximates the content of the original text in the same way as a translation diverges from its source text. Whitley aptly argues:

> Any communication of knowledge claims involves an amount of redefinition, which subtly alters them so that the popularisation of true knowledge to a wide audience always results in alterations to it. This is not simply a matter of 'distortion' of the true message, but is rather an inevitable concomitant of *translation* from one system of discourse to another. The greater the linguistic and cognitive distance between such systems, the more alteration occurs.
>
> (Whitley 1985: 7, my italics)

Approximation increases with the size of the non-specialist audience targeted by the popularisation. This idea is confirmed by Deaglio:

> There is an inverse relationship between a concept's degree of popularisation and its precision, so that – if popularising skills are equal – the loss of precision, implication and operational potential of a concept is proportional to the number of people for which it is made comprehensible by simplification.
>
> (Deaglio 1983: 195, my translation)

This phenomenon is also favoured by the widespread use of metaphor and simile in popularising processes. Both techniques establish a direct link with the public's general knowledge, which makes the content easier to identify. See, for example the claim that 'an atom is a miniature solar system', where the analogy provides a tangible interpretative framework for such a highly abstract concept as an atom. However, these techniques sometimes risk ambiguity by suggesting wrong associations, unconnected to the idea conveyed by the metaphor or simile.

2. Linguistic features of popularisation

The linguistic redrafting techniques employed in the process of popularisation have not so far attracted much research; for this reason, the results achieved are still partial. Some analyses, however, have produced interesting findings; among these, Halliday's (1987) study of a text redrafted in a more concise and compact way, with far less lexical density, from a piece of legal writing (cf. Chapter 3 of this volume). Another feature that distinguishes the wording of popularisations, as compared to specialized texts, is the absence among the former of linguistic expressions realising the communicative functions of argumentative texts, with their stress on authorial contribution in terms of conceptual innovation. In this genre there is no explicit authorial reference to the illocutionary value of utterances, with the omission of such expressions as 'I have called', 'I mean by this', 'I argue that', 'My contention is', 'Quite legitimately we regard', 'I have to point out', etc. The lack of such expressions in popularisations is no remarkable feature, however, because the prevalently informative nature of the genre implies less emphasis on the argumentative function. Of greater interest are the different linguistic realisations of the same communicative function in each text type. The remaining part of this chapter will focus therefore on the expressive strategies employed in popularisations and specialized discourse to convey a rhetorical function (i.e. Definition) that is

widely present in both genres. The aim is to identify any special textual differences – whether qualitative or quantitative – that deserve attention.

3. Definition in popularised texts

Within the different text types, the use of terminology and definition varies greatly. This is because the occurrence of discipline-specific terms is very high in fully specialized texts (i.e. those produced by specialists for their peers) and in pedagogic specialized texts (written for training new specialists). Fewer technical terms are employed instead in popularisations, where discourse relies chiefly on words drawn from general language. Also the use of definition varies quantitatively, though not in the same way as terminology. Indeed, the defining process is employed repeatedly in pedagogic texts because the author's purpose is to illustrate systematically not only the conceptual but also the linguistic organisation within a given discipline. Terminological definition is not so pervasive in specialized discourse, where the meaning of certain expressions is taken for granted within the disciplinary community; definition is not very common even in popularisations, which involve a far more limited use of specialized lexis. In specialized discourse, the author only employs definition when a new term is coined, or new meanings are attached to existing words within the discipline or borrowings from other disciplines or the general language. This produces highly subjective utterances, which in English take on the following appearance (examples from Keynes 1936 / 1973):

(1)   We shall call the unit in which the quantity of employment is measured the labour-unit; and the money-wage of a labour-unit we shall call the wage-unit. (p. 41)

(2)   My definition is, therefore, as follows: ... (p. 15)

(3)   The classical postulates do not admit of the possibility of the third category, which I shall define below as 'involuntary' unemployment. (p. 6)

(4)   This state of affairs we shall describe as 'full' employment, both 'frictional' and 'voluntary' unemployment being consistent with 'full' employment thus defined. (pp. 15-16)

The first-person subject never appears in definitions from popularisations, whose purpose is informative rather than innovative or interpretative. A further structural distinction between genres regards the way authors refer to third-party definitions. In specialized discourse, the locutor generally names the person who codified a term or rephrased a concept with new words, as in the following examples:

(5)   'The classical economists' was a name invented by Marx to cover Ricardo and James Mill and their predecessors, that is to say for the founders of the theory which culminated in the Ricardian economics. (p. 3)

(6)   An increase in the marginal physical productivity of labour in the wage-goods industries (to use Professor Pigou's convenient term for goods upon the price of which the utility of the money-wage depends) [...] (p. 7)

(7)   The national dividend, as defined by Marshall and Professor Pigou, measures the volume of current output of real income and not the value of output or money-income. (pp. 37-8)

In popularisations, on the other hand, definitions are seldom linked to their originator; impersonal or passive forms are the norm:[2]

(8)   First, individual genes are involved in multiple biological processes – a widely accepted concept known as pleiotropy. (*SA2*, 22)

(9)   A term that has been applied to describe what has happened to many metropolitan areas of the U.S. since World War II is 'doughnut complex'. In many places the hole in the doughnut is a decaying central city and a ring is a prosperous and growing suburban region. (*SA1*, 40)

Another way for the locutor to refer vaguely to the origin of a definition is to mention an entire disciplinary category or profession, as illustrated below, where the words *astronomers* and *scientists* are employed:

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2   Quotations of English popularisations are taken from the following sources: *D.*: *Discover*, August 1982 / *PS*: *Popular Science*, August 1982 / *SA1*: *Scientific American*, August 1980 / *SA2*: *Scientific American*, April 1993.

(10)   Many galaxies, including the Milky Way, have powerful energy sources at their centers that blaze radiation over the entire electromagnetic spectrum, including infrared. 'The machine', as astronomers call it, can outshine (in infrared alone) millions or even billions of suns, even though it is only about the size of the solar system. (*D*, 42)

(11)   [...] relict being the name scientists give to an animal or a plant that was once widespread but is now confined to a small area. (*D*, 51)

In a pedagogic setting, definitions typically display the following forms:

- *P* is named *x*. (where *x* is the specialized term and *P* its periphrasis)
- *x* is *P*.

These patterns, however, are not very frequent in popularisations. The most common defining technique in such texts is juxtaposition – a process whereby the specialized term is followed by its periphrasis, with the two separated by a comma, dash or parenthesis. See, for example, the following cases:

(12)   More than 99 per cent of atmospheric water vapor is in the troposphere, the turbulent, weather-producing zone below about 40,000 feet. (*D*, 40)

(13)   That year, John Vane, a British researcher, discovered that aspirin interferes with the synthesis of prostaglandins – short-lived, hormone-like substances made by most cells in the body after an injury. (*D*, 19)

(14)   A one-inch-diameter rod of super-pure glass is heated and drawn down to a fiber just 125 microns (five thousandths of an inch) thick. (*PS*, 72)

A variant of this technique is to offer a periphrasis followed (after a comma, parenthesis or dash) by the equivalent specialized term:

(15)   After 25 years of repeated review, an injectable synthetic hormone, Depo-Provera, was approved by the Food and Drug Administration last year. (*SA2*, 8)

(16)   The single light beam is pulsed at a rate of 140 million bits (megabits) per second – a multiplexed signal of individual speech channels with full clarity and no cross talk. (*PS*, 72)

These two patterns reflect two different logical processes – one inductive and the other deductive. In the former, the author first presents the features of the concept conveyed by the term and later gives the term itself, while in the latter the definition follows the term. The two sentences below clearly illustrate this difference:

(17)   Certain atoms are unstable combinations of the fundamental particles. These atoms spontaneously emit rays and are thereby transmuted into atoms of different chemical identity. This process, *radioactivity*, was discovered by Henry Becquerel in 1896. (Darian 1982: 37)

(18)   In a process called binaural fusion, the brain compares information received from each ear and then translates the differences into a unified perception of a single sound issuing from a specific region of space. (*SA2*, 34)

The juxtaposition of term and periphrasis establishes a semantic equivalence resembling the typical structure of a monolingual dictionary, where each entry is followed by its periphrasis. Dictionaries also place definitions immediately after a term, using an elliptic expression that usually omits the copula. An example is the following comparison of the same term (*microtubule*) as defined in two different texts: the former is an encyclopaedic definition, contrasting with a popularised version:

(19)   MICROTUBULE One of the hollow tubelike filaments found in certain cell components, such as cilia and the mitotic spindle, and composed of repeating subunits of the protein tubulin. (The *McGraw-Hill Dictionary of Scientific and Technical Terms* 1978)

(20)   Among these structures are the cellular organelles known as microtubules: long, slender tubes that function, sometimes as fairly rigid rods and sometimes as rather flexuous ropes, to maintain and change the shape of the cell or its component parts, to move material through the cell and to separate the duplicated sets of chromosomes in the course of cell division. (SA1, 59)

Very often the two parts of a definition are joined by such metalinguistic items as *called, known as, that is, meaning* and others in the same class:

(21)   It has developed a computer-based system of pipeline surveillance, called on-line inspection, using robots which pass through the pipes without impeding

the gas flow, in order to certify that there will be no catastrophic failure of the system through the effects of ageing. (*SA1*, 26)

(22) Physicists are betting that a Bose condensation of hydrogen can be achieved at a balmy 30 microkelvins, that is, 30 millionths of a degree above absolute zero. (*SA2*, 14)

(23) Consequently, the M.I.T. experimenters had to work with atoms in special states known as Rydberg states. An atom in a Rydberg state has almost enough energy to lose an electron completely. (*SA2*, 26)

Sometimes the specificity of a term is emphasised by a special expression – e.g. the adverb *technically* in the sentence below – signalling its divergence from the layman's definition offered earlier:

(24) The barn owl extracts directional information from disparities in the timing and the intensity of signals reaching the two ears – technically called interaural time differences and interaural intensity differences. (*SA2*, 34)

Another frequent option is the disjunctive conjunction *or*:

(25) Polymer chemistry has entered a new dimension. Most polymers are nothing more than identical molecular units, or monomers, that are linked together to form one-dimensional chains. (*SA2*, 11)

(26) But it did increase as the speaker was moved up or down from eye level – at least when the sound included waves of frequencies higher than three kilohertz, or 3,000 cycles per second. (*SA2*, 35)

Sometimes the use of juxtaposition makes the definition too concise and fails to explain the exact function of a given item. This occurs in the text below, where the clotting function of platelets is not mentioned in the brief definition between two dashes and has to be reconstructed by the reader from the text that follows:

(27) When released from platelets – minute discs in the blood – a prostaglandin called thromboxane makes them clump together, which helps initiate clotting. (*D*, 19)

The specialized term is very often given in inverted commas or in italics, so as to stress its divergence from general language. In the text below, for instance, the term *mono-mode* is inserted through this

device into the first part of the text, and only later explained and related to the term *multi-mode*:

(28)   An ultra-fine thread of glass using 'mono-mode' light transmission does the trick. [...] Such a microscopic core is just large enough to conduct a single ray of light carrying a pulsed, digital signal, reflected inside the fiber in a shallow zigzag line. In contrast, a multi-mode fiber carries several hundred different ray paths or modes. (*PS*, 72)

Elsewhere the use of inverted commas points to the prescriptive value (Naess 1981) attached to the defining process. By this device, the popularised text indicates that from that point onwards the term given in quotation marks should be understood as suggested by the periphrasis. The stipulative value of inverted commas for defining purposes is confirmed by the fact that later in the text the term is used without any marking, as the author takes its semantic value for granted. An example of this process is given below:

(29)   Linde's theory builds on a concept he helped to devise called 'inflation'. It holds that just after the big bang, when the universe was fantastically small, hot and dense, it underwent a prodigious growth spurt before settling down to its current, relatively slow rate of expansion. [...] Early versions of inflation, which relied heavily on particle physics, called for highly specialized, 'fine-tuned' conditions. (*SA2*, 10)

The reader's textual competence and reading strategies are often exploited by popularisers, who are then free to select alternative defining techniques. See, for instance, how the following text signals the hormonal nature of estrogen and progesterone through the deictic item *these*:

(30)   The scientists simultaneously administer estrogen and progesterone to prevent postmenopausal symptoms, but they say the amounts of these hormones are significantly lower than those found in birth control pills. (*SA2*, 8)

Interestingly, the definition may contain metalinguistic items that encode an authorial comment of the periphrasis. Such comments show that the populariser is aware of the semantic approximation inherent in the suggested periphrasis, which is perceived as an imperfect

rendering of the original term. This is signalled by such expressions as *a little, like, a sort of*:

(31)   The brain is a sort of computer.

(32)   En fait le neurone fonctionne un peu comme un clapet. (Authier 1982: 42)

The great need for clarity inherent in popularisations often leads authors to rely on figurative language taken from everyday experience; the lower specificity of such referents is emphasised in the text by such expressions as *in other words* or *so-called*:

(33)   If your switches are fast enough, you can double the clock rate and end up with two independent machines running on the same hardware 'in parallel' – actually interleaved in time. At 100 magahertz, in other words, the BSOC develops a split personality. (*SA2*, 86)

(34)   Because they raid nests, female sticklebacks represent the greatest source of stress for the males (apart from birds). [...] The stress has a so-called femme fatale effect on the male. (*SA2*, 55)

These expressions occur almost exclusively in popularisations, since the degree of approximation is incompatible with the nature of fully specialized texts. Sometimes approximation is signalled by the use of inverted commas. This orthographic device is often employed to connotate similes and metaphoric uses of language, which attempt to establish a concrete relationship between the specialized term and a word from the general language. The following utterances illustrate this type of metalinguistic process:

(35)   In addition, the reactor core would be surrounded by a blanket of depleted uranium which, by absorbing neutrons, could be used to 'breed' new plutonium, for reuse in the core. (*SA1*, 28)

(36)   Pruteen is an animal feedstuff grown continuously in the world's biggest fermenter – 600 tons and over 60 ft. tall – by feeding a bacterium, *Methylophilus methyltrophus*, on methanol made from natural gas. Bacteria yield 50-80 per cent protein. But in order to maintain a high yield of the organism ICI finds it has to inject the 'fuel' very uniformly, at 3,000 points throughout the fermenter. (*SA1*, 28)

Appendices

Appendix 1

<div align="center">

AGREEMENT
for letting furnished dwellinghouse
on an assured shorthold tenancy
under Part I of the Housing Act 1988

</div>

5   Date   *1st September 2002*

     Parties   1. The Landlord   *Mr [name]*
                                                  Vincent Road
                                                  Isleworth
                                                  Middlesex TW7 4LT

10   2. The Tenant   *Mr [name]*
                                                   Granwood Court
                                                   The Grove
                                                   Isleworth
                                                   Middlesex

15   Property   The dwellinghouse situated at and being
                            Granwood Court
                            The Grove
                            Isleworth
                            Middlesex
20   *(2 bedroom flat – fully furnished)*
                            Together with the Fixtures Furniture and Effects therein and more
                            particularly specified in the Inventory theoreof signed by the parties

            Term   A term certain of *six*   months from   *1.9.2002*

            Rent   *£600.00 (six hundred pounds)*   (subject
25   nevertheless as hereinafter provided) for every *month* of the Term

            Payable   in advance by equal *monthly* payments on *1st day of each month*

                            First payment to be made on the   *1st*   day of   *September 2002*
                            terminating on 28th February 2003

1. The Landlord lets and the Tenant takes the Property for the Term at the Rent
30   payable as above

2. This agreement is intended to create an assured shorthold tenancy as defined
in section 20 of the Housing Act 1988 and the provisions for the recovery of
possession by the Landlord in section 21 thereof apply accordingly

3. Where the context admits–
35   (a)   'The Landlord' includes the persons for the time being entitled in
reversion expectant on the tenancy
(b)   'The Tenant' includes the persons deriving title under the Tenant
(c)   References to the Property include references to any part or parts of the
Property and to the Fixtures and Effects or any of them

40   4. The Tenant will–
(a)   Pay the Rent at the times and in the manner specified
(b)   Pay for all gas and electric light and power which shall be consumed or
supplied on or to the Property during the tenancy and the amount of the
water rate charged in respect of the Property during the tenancy and the
45   amount of all charges made for the use of the telephone on the Property
during the tenancy or a proper proportion of the rental or other recurring
charges to be assessed according to the duration of the tenancy
(c)   Not damage or injure the Property or make any alteration in or addition
to it
50   (d)   Preserve the Fixtures Furniture and Effects from being destroyed or
damaged and not remove any of them from the Property
(e)   Yield up the Property at the end of the tenancy in the same clean state
and condition as it was in the beginning of the tenancy and make good
pay for the repair or replace all such items of the Fixtures Furniture and
55   Effects as shall be broken lost damaged or destroyed during the tenancy
(reasonable wear and damage by fire excepted)
(f)   Leave the Furniture and Effects at the end of the tenancy in the rooms or
places in which they were at the beginning of the tenancy
(g)   Pay for the washing (including ironing or pressing) of all linen and for the
60   washing and cleaning (including ironing and pressing) of all counter-
panes blankets and curtains which shall have been soiled during the
tenancy (the reasonable use thereof nevertheless to be allowed for)
(h)   Permit the Landlord or the Landlord's agents at reasonable hours in the
daytime to enter the Property to view the state and condition theoreof
65   (i)   Not sublet or part with possession of the Property without the previous
consent in writing of the Landlord
(j)   Not carry on on the Property any profession trade or business or let
apartments or receive paying guests on the Property or place or exhibit
any notice board or notice on the Property or use the Property for any
70   other purpose than that of a strictly private residence
(k)   Not do or suffer to be done on the Property anything which may be or
become a nuisance or annoyance to the Landlord or the Tenants or
occupiers of any adjoining premises or which may vitiate any insurance
of the Property against fire or otherwise or increase the ordinary
premium for such insurance

75   (l)   Permit the Landlord or the Landlord's agents at resonable hours in the daytime within the last twenty-eight days of the tenancy to enter and view the Property with prospective tenants

5. Provided that if the Rent or any instalment or part thereof shall be in arrear for at least fourteen days after the same shall have become due (whether legally

80   demanded or not) or if there shall be a breach of any of the agreements by the Tenant the Landlord may re-enter on the Property and immediately thereupon the tenancy shall absolutely determine without prejudice to the other rights and remedies of the Landlord

6. The Landlord agrees with the Tenant as follows–

85   (1)   To pay or indemnify the Tenant against all rates assessments and outgoings in respect of the Property (except the water rate and except charges for the supply of gas or electric light and power or the use of any telephone)

(2)   That the Tenant paying the Rent and performing the agreements on the

90   part of the Tenant may quietly possess and enjoy the Property during the tenancy without any lawful interruption from the Landlord or any person claiming under or in trust for the Landlord

(3)   To return to the Tenant any rent payable for any period while the Property is rendered unhinhabitable by fire the amount in case of dispute

95   to be settled by arbitration

A returnable security of £600.00 which will be held by the Landlord against breach of contract and further against breakage or damage in or to the property and will be fully recovered to the Tenant on termination of tenancy

7. This Agreement shall take effect subject to the provisions of section 11 of the

100   Landlord and Tenant Act 1985 if applicable to the tenancy

AS WITNESS the hands of the parties hereto the day and year first above written

SIGNED by the above-named

In the presence of

[Signatures]

70 areas and on products related to such services. Such grant shall also include the right of the Member Firm to enter into Sublicense Agreements with Sublicensees, subject to prior approval by the Executive Committee of Grantor (as defined in the *DJRW* Statutes) of the terms and conditions of the Sublicense Agreement and of the acceptability of the Sublicensee.

75 b. The license hereby granted shall be effective as of the date set forth above and shall continue indefinitely unless terminated in accordance with the provisions hereof.

2. <u>Terms of Payment</u>

80 The Member Firm has paid to Grantor the sum of *S.fr.1* and Grantor hereby acknowledges receipt thereof as full payment for this license. The parties also acknowledge the mutual promises made herein as consideration for this Agreement.

85 3. <u>Grantor's Title and Protection of Grantor's Rights</u>

a. The Member Firm has become a signatory to the *DJRW* Statutes and hereby agrees to be bound by the terms and conditions of this Agreement and the attached Component License Agreement, and recognizes and

90 acknowledges Grantor's exclusive ownership and title to the name *"Dale Johnson Ryder Warren"* and the service marks set forth in the attached Appendix A, and the value of the associated goodwill, subject to the limits set forth in the Component License Agreement. The

95 Member Firm agrees that it will not challenge the title or any rights of Grantor in and to the name *"Dale Johnson Ryder Warren"* and the service marks set forth in the attached Appendix A, or make any claim or take any action adverse to Grantor's ownership therein, or

100 challenge the validity of this Agreement. The Member Firm further agrees that its every use of the name *"Dale Johnson Ryder Warren"* and the service marks set forth in the attached Appendix A shall inure to the benefit of Grantor, subject to the terms and conditions of the

105 Component License Agreement.

b. The Member firm agrees, both during and after the term of this Agreement, to cooperate fully and in good faith with Grantor and to execute such documents as Grantor reasonably requests for the purpose of securing and

110   preserving Grantor's rights in and to the name *"Dale Johnson Ryder Warren"*   and to the service marks set forth in the attached Appendix A.

c. The Member Firm shall notify Grantor in writing, of any infringement, imitation, passing off or use of the Service

115   Marks or any confusingly similar marks by any third party which comes to its attention. The Member Firm, as licensee, shall have the right to decide whether or not proceedings shall be brought by the Member Firm against any such third parties. In the event that it is

120   decided that action should be taken against any such third party, the Member Firm may take such action in its own name. If the Member Firm chooses not to bring proceedings against any such third party, Grantor shall be entitled to bring proceedings in the name of the

125   Member Firm and, in such event, the Member Firm agrees to cooperate fully with Grantor to whatever extent it is necessary or appropriate to prosecute such action. All legal costs shall be borne by the Member Firm and any damages awarded shall be equitably

130   apportioned on the basis of damages suffered and costs incurred.

4. Professional Standards and Quality Control
The Member Firm shall conduct its affairs in a manner consistent with the professional standards set forth in the

135   *DJRW*   Statutes and any regulations thereto to the end of maintaining the prestige and high professional standards associated with the Service Marks.

5. Withdrawal and Termination
a. In the event of the Member Firm's withdrawal from

140   or termination of membership in Grantor under Article 4 of the   *DJRW*   Statutes:
(i) such withdrawal or termination shall in no way affect the right of Grantor to use and/or license the Service Marks;

145   (ii) such withdrawal or termination shall terminate the Member Firm's right to continue using the Service Marks, or any marks or names that are likely to cause confusion therewith, except the Member Firm shall be permitted to use the name
150   *"Dale Johnson Ryder Warren"* or any trade name in use at that time that includes any one or more of the components thereof, alone or in combination with other names, in connection with work in progress as a trade name for signature purposes
155   for twelve (12) months following the effective date of such withdrawal or termination and, in the event the Member Firm is terminated, it shall also be permitted to continue to use the Service Marks for six (6) months after the date of termination;

160   (iii) the Member Firm shall assign to any successor firm chosen by Grantor ("Successor Firm") all common law rights in and all registrations for the Service Marks or any names or marks likely to cause confusion therewith, and all goodwill
165   associated therewith. Such Successor Firm, upon becoming a member firm of Grantor and upon execution of a license agreement similar in form and substance to this Agreement, shall immediately have the right to use the Service Marks during the
170   period within which the Member Firm continues to have any right to use the Service Marks under Section 5.a.(ii) hereof if such use is not prohibited in the jurisdiction of intended use.

         b. In the event of dissolution of Grantor the parties hereto
175   agree that the licenses granted herein shall terminate immediately. The parties agree that after such dissolution the Member Firm may only retain those name and service mark common law rights, registrations, or applications therefor, which do not
180   derive from grants received under the *DJRW* Statutes, the Component License Agreement or this Agreement. The parties specifically agree that in the event of such dissolution they shall be restored to their positions before execution of such agreements, except

185   that the parties may mutually agree to a phase out
                  period in connection with any such licensed rights.

6. Financial, Statistical and Accounting Information

      a. The Member Firm shall supply memorandum
          accounting information to the International Office of
190   *Dale Johnson Ryder Warren*   for the purpose of
          preparation of a financial and statistical information
          statement relating to Grantor. Such information will be
          supplied at least annually as directed by the Executive
          Committee of Grantor.
195   b. The Executive Committee of Grantor shall have the
          right to an inspection or review of the accounting
          records of the Member Firm.

7. Applicable Law

    The relationship between the signatories to this Agreement
200 shall be governed by the terms and conditions set forth
    herein. In all respects the applicable law shall be the law of
    Switzerland, except that the validity of the Service Marks in
    any jurisdiction shall be governed by the law of the
    jurisdiction in which rights relating to the Service Marks are
205 sought to be exercised.

8. Validity

      a. The language of this Agreement and all documents,
          meetings and proceedings relating thereto shall be
          English.
210   b. No modifications, amendments or supplements to this
          Agreement shall be effective for any purpose unless
          duly recorded in writing and signed by authorized
          representatives of all parties hereto or their successors
          or assigns.
215   c. If any provisions of this Agreement should be invalid or
          inoperable, this shall not affect the validity of the
          remaining provisions of this Agreement. The parties
          hereto shall in such event use their best efforts to
          substitute for any invalid or inoperable provision a valid
220   or operable arrangement which achieves results as
          nearly equivalent as possible to the invalid or inoperable
          provision.

Investigating Specialized Discourse is a shortened and revised textbook edition of the monograph *Specialized Discourse* (2003). This book analyses the various features of specialized discourse in order to assess its degree of specificity and diversification, as compared to general language. Prior to any analysis of such traits, the notion of specialized discourse and its distinctive properties are clarified. The presence of such properties is accounted for not only in linguistic but also in pragmatic terms since the approach is interpretative rather than merely descriptive. Indeed, the complexity of this discourse calls for a multidimensional analysis, covering both lexis and morpho-syntax as well as textual patterning. Some lexical aspects, morpho-syntactic features and textual genres are also examined from a diachronic perspective, thus showing how various conventions concerning specialized discourse have developed over the last centuries.

Maurizio Gotti is Professor of English Linguistics at the University of Bergamo. He is Director of CERLIS, the research centre on specialized languages based at the University of Bergamo. His main research areas are the features and origins of specialized discourse (*Robert Boyle and the Language of Science*, 1996, *Specialized Discourse: Linguistic Features and Changing Conventions*, 2003).